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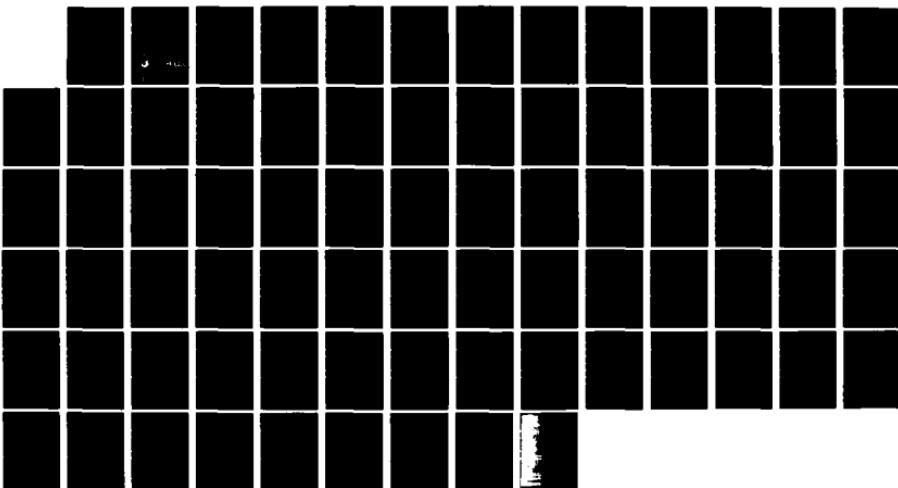
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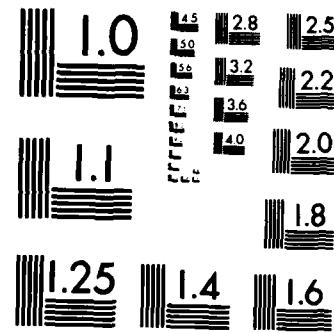
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AIR TRANSPORTABLE AS32/P-4 CRASH RESCUE VEHICLE

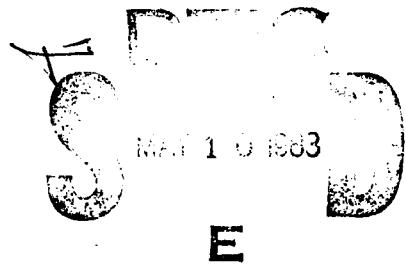
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FEECON CORPORATION
ONE WALKUP DRIVE
WESTBORO MA 01581

MARCH 1983

FINAL REPORT
SEPTEMBER 1979 - MAY 1980



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The modification proved to be highly successful. The non-air-aspirating turret was shown to have twice the effective discharge range. The modified vehicles can be air transported on a C-130 aircraft without disassembly of the fire suppression system.

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PREFACE

This report was prepared by the Feecon Corporation, 1 Walkup Drive, Westboro, MA 01581, under Contract Number FO 8635-79-C-0286 and Job Order Number 2505-4007 with the Air Force Engineering and Services Center, Engineering and Services Laboratory, Tyndall Air Force Base, FL 32403. The work described in this report was completed in May 1980.

The information contained herein describes the modification and testing of the P-4 for air transportability. This work was performed at the Feecon Corporation and at Westover Air Force Base, MA. Project Officer was Captain Anthony J. Kwan, AFESC/RDCS.

This report has been reviewed by the Public Affairs Office (PA) and is releasable to the National Technical Information Service (NTIS). At NTIS it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

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F:	

TABLE OF CONTENTS

Section	Title	Page
I	INTRODUCTION.....	1
	1. OBJECTIVE.....	1
	2. BACKGROUND.....	1
	3. APPROACH.....	1
II	TEST SUMMARY.....	2
III	FACTUAL DATA.....	6
	1. TEST APPARATUS.....	6
	2. TEST PROCEDURES.....	6
	3. CALCULATIONS.....	6
	4. PROPORTIONING DATA.....	7
	5. DUMPER TURRET DISCHARGE PATTERNS.....	9
IV	P-4 AIR TRANSPORTABILITY MODIFICATION.....	17
	1. REMOVAL OF ELECTRICAL COMPONENTS.....	17
	2. REMOVAL OF BUMPER TURRET.....	17
	3. ROOF TURRET REMOVAL.....	17
	4. ROOF TURRET FEED DISASSEMBLY.....	18
	5. REMOVAL OF ROOF TURRET PIPE AND COVER.....	18
	6. REMOVAL OF BEACON/SIREN ASSEMBLY.....	19
	7. REMOVAL OF WATER VENT.....	19
	8. REMOVAL OF FOAM VENT.....	19
	9. INSTALLATION OF WATER VENT.....	19
	10. INSTALLATION OF FOAM VENT.....	19
	11. INSTALLATION OF FRONT BEACON LIGHT AND SPEAKER.....	20

TABLE OF CONTENTS (CONTINUED)

Section	Title	Page
	a. Installation of Beacon Light and Speaker to Mounting Bracket.....	20
	b. Installation of Beacon and Speaker Mounting Bracket to Vehicle.....	20
12.	INSTALLATION OF REAR BEACON.....	20
	a. Installation of Beacon Light to Mounting Bracket.....	21
	b. Installation of Light Bracket to Vehicle.....	21
13.	INSTALLATION OF BUMPER TURRET.....	21
14.	INSTALLATION OF BUMPER TURRET PIPING.....	22
V	P-4 AIR TRANSPORTABLE VEHICLE DESCRIPTION.....	24
	1. HYDRAULIC BUMPER TURRET.....	24
	2. TURRET CONTROLS.....	24
	3. TURRET HYDRAULIC SYSTEMS.....	25
VI	OPERATING PROCEDURES.....	26
	1. HYDRAULIC OPERATION.....	26
	2. MANUAL OPERATION.....	27
VII	MAINTENANCE AND TROUBLESHOOTING.....	28
	1. PREVENTATIVE MAINTENANCE	28
	2. ROTATION ADJUSTMENT.....	28
	a. Aligning the Turret and Manual Control Handle.....	28
	b. Aligning the Turret and Rotation Actuator.....	28

TABLE OF CONTENTS (CONCLUDED)

Section	Title	Page
	3. FLOW RATE SELECTOR ADJUSTMENT.....	29
	a. High Flow Rate Adjustment.....	29
	b. Button Adjustment.....	30
	c. Low Flow Rate Adjustment.....	30
	4. SHUTOFF VALVE ADJUSTMENT.....	30
	5. REMOVAL OF NOZZLE ASSEMBLY.....	30
	6. TURRET HEAD REMOVAL.....	31
	7. REMOVAL OF TURRET BODY.....	31
	8. REMOVAL OF TURRET BASE.....	32
	9. DISCHARGE NOZZLE REASSEMBLY.....	33
	10. TURRET HEAD REASSEMBLY.....	33
	11. BODY REASSEMBLY.....	34
	12. BASE REASSEMBLY.....	35
VIII	CONCLUSIONS.....	36
 Appendix		
A	AS32/P-4 AIR TRANSPORTABILITY DRAWINGS.....	37
B	AS32/P-4 AIR TRANSPORTABILITY BILL OF MATERIALS.	50

LIST OF FIGURES

Figure	Title	Page
1	P-4 Roof Turret Assembly.....	38
2	P-4 Roof Turret Inner Panel Assembly.....	39
3	P-4 Speaker and Beacon Lights Wiring Assembly...	40
4	P-4 Bumper Turret Piping Assembly.....	41
5	P-4 Roof Turret Modification Kit.....	42
6	Turret Controls.....	43
7	Bumper Turret.....	44
8	Discharge Control Assembly.....	45
9	Shutoff Valve Assembly.....	46
10	Nozzle Assembly.....	47
11	Base Body Assembly.....	48
12	Mounting Bracket Assembly.....	49

LIST OF TABLES

Table

1	FIRST ARTICLE TEST, A532/P-4 AIR TRANSPORTABILITY BUMPER TURRET.....	3
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SECTION I

INTRODUCTION

1. OBJECTIVE

The objective of this project was to develop an alternate turret configuration on the AS32/P-4 which enables the vehicle to be air transported without disassembling the fire suppression system.

2. BACKGROUND

The AS32/P-4 vehicle is designed to be transportable on C-130 aircraft. However, all of the components on the roof must be removed before the vehicle can enter the aircraft. Trained vehicle maintenance mechanics are required to remove the turret, prepare the vehicle for shipment and return the vehicle to its configuration upon arrival. Without the roof turret, the vehicle cannot operate its fire suppression system. Also, repeated roof turret removal and replacement increase the chances of damage to the turret.

3. APPROACH

In January 1979, a Statement of Work (SOW), P-4 Air Transportability, was prepared for the design and testing of a 400/800 gpm bumper turret. An AS32/P-4 fire vehicle from Charleston Air Force Base, S.C., was sent to the Feecon Corporation to be modified for air transportability. The truck was tested by Feecon personnel in Westboro, MA and was driven into a C-130 at Westover Air Force Base.

All testing was done in accordance with the SOW for P-4 Air Transportability dated 4 January 1979. Tests were performed by J. E. Gagliardo, R. M. Bosse and N. Beausoleil, from 22 April to 14 May 1980.

SECTION II

TEST SUMMARY

The results of these tests are tabulated in the Test Summary. The turret ground patterns for both Foam and Water in the straight-stream and maximum-dispersed discharge patterns are shown in Table 1.

The turret met all requirements of the SOW for P-4 Air Transportability, dated 4 January 1979.

The trip to Westover Air Force Base (60 miles) on April 22, 1980 qualified as the road test. At Westover Air Force Base, the vehicle was driven into a C-130 without having to remove anything from the roof. However, the rear lights just cleared the aircraft.

The Air Force requested the rear lights be lowered, and also noted that the hydraulic directional handle was twisting while being operated. The lights have been lowered by 1 inch. The handle is now pinned in place so that it no longer twists.

The Air Force also requested that the front beacon light be operated at night to see if glare would hinder the driver's vision. Night operation of the front beacon did not produce sufficient glare to hinder the driver's vision.

More details on testing and modifications required by the SOW are presented in subsequent sections.

TABLE 1. 1st ARTICLE TEST P-4 AIR TRANSPORTABILITY 'BUMPER' TURRET CONTRACT
F08635 79 C 0286 FEECON PART NUMBER 00798010

TEST	SPEC. PAR OF SOW	SPEC. REQ.	PASS	FAIL
Roof Turret Capping	4.1.2	Watertight	X	
Bumper Turret Removal	4.1.3	Remove and retain parts of original bumper turret	X	
Bumper Turret Horizontal Rotation	4.2.3.3	170°	X	
Vertical Movement	4.1.4	15° below 60° above horizontal		
Discharge Capacity Dual Rate	800 GPM & 400 GPM	Fog - Straight Stream- Fog - Straight Stream-	X	X
Internal Piping	4.2.3.2 5.1.5	Piping shall be installed to allow normal operation of new turret and no leakage	X	
Bumper Turret Directional Control	4.1.6	Single Control Lever Capable of being operated with one hand	X	

TABLE 1. 1st ARTICLE TEST P-4 AIR TRANSPORTABILITY BUMPER TURRET CONTRACT
F08635 79 C 0286 FEECON PART NUMBER 00798010 (CONTINUED)

TEST	SPEC. PAR OF SOW	SPEC. REQ.	PASS	FAIL
Turret Controls	4.1.7	Controls shall be easily accessible to the equipment operator and driver. Directional Control Lever shall have push button discharge interrupt button. The discharge valve shall remain open in case of failure.	x	
Agent Discharge Water	4.1.9 4.2.3.5 & MIL-T-83235; Para 3.12. 9.4.1	45° Cone Angle in Max. Fog 150 foot range min.	x	
Foam	4.2.3.4	6.0-6.6% Proportioning 160 foot range min. 30 ft fog pattern.	x	
Air Transportability	4.1.10	Fit in C-130 without disassembly		
Beacon/Siren Assembly Relocation	4.1.11	Relocate to allow for air transportability without removal	x	

TABLE 1. 1st ARTICLE TEST P-4 AIR TRANSPORTABILITY BUMPER TURRET CONTRACT
F08635 79 C 0286 FEECON PART NUMBER 00798010 (CONCLUDED)

TEST	SPEC. PAR OF SOW	SPEC. REQ.	PASS	FAIL
Roof Hatch Handle	4.1.12	Modify for Air Transportability		
Water Tank Vent Redesign	4.1.13	Modify for Air Transportability on a 20° Angle	X	
Foam Tank Vent Redesign Examination of Product	4.1.14 4.2.3.1	Inspect for proper installation adjustment and serviceability	X	
Mechanical Checks	4.2.3.6	Inspection of installation and components for damage and undue wear after testing	X	
Road Test	4.2.3.7	Drive over uneven terrain for 5 miles at 15 MPH	X	
Loading Demonstration	4.2.3.8	Drive into C-130	X	
		Modifications required as a result of testing 4-2-80 Lower Rear Lights one inch to clear C-130 Test Front Beacon Light at night for a glare on the windshield that would hinder the driver's vision Pin Hydraulic Directional Control Handle to prevent twisting		

Testing was completed 5-14-80

SECTION III
FACTUAL DATA

1. TEST APPARATUS

<u>ITEM</u>	<u>MAKE</u>
Stop Watch	Heuer
Refractometer	American Optical
1900-Gallon Calibrated Tank	
11-inch Diameter Pans x 4 inches high	
100-foot Tape Measure	

2. TEST PROCEDURE

The discharge capacity test was conducted by discharging the bumper turret for 3 minutes. The P-4 water tank had been filled with water. The amount of water discharged was determined by measuring the amount of water needed to refill the water tank. The water tank was refilled by drafting out of the 1900-gallon calibrated tank (see calculations for determination of actual discharge rate).

The pattern tests for agent system foam discharge and agent water system discharge were conducted by discharging the bumper turret along a measured grid for specific lengths of time (30 seconds for all foam tests and 1 minute for all water tests). The grid consisted of several 112-inch diameter pans at pre-measured points. The amount of discharge collected in each pan during the run was measured to determine the coverage per square foot. The effective pattern was determined to be the area in which the application rate was at least 0.2 gpm.

The modified vehicle was driven 60 miles to Westover Air Force Base, then into a C-130, without having to remove anything from the roof.

3. CALCULATIONS

Discharge Capacity

High Flow - Fog

1900-Gallon Tank Calibrations

Tank Diameter = 72 inches

$$\begin{aligned}\text{Gallons/Feet} &= \text{Area} \times \text{Height (in inches)} \\ &\quad 231 \text{ Cubic Inches/Gallons} \\ &= \frac{(\underline{72 \text{ in}})^2 \times 12 \text{ in}}{4} = 211.5 \text{ gal/ft} \\ &\quad \underline{\underline{231 \text{ Cubic Inches/Gallons}}}\end{aligned}$$

Gallons of Water Discharged from 1900-Gallon Tank

Water Level Dropped

$$3.9 \times 211.5 = 829 \text{ Gallons}$$

Discharge Time = 1.0 Minutes

$$\begin{aligned}\text{Discharge Rate} &= \frac{829 \text{ Gallons}}{1 \text{ Minute}} \\ &= 829 \text{ gpm}\end{aligned}$$

Low Flow - Straight Stream

Water Level Dropped 2.05

$$2.05 \times 211.5 = 433 \text{ Gallons}$$

Discharge Time = 1.0 Minutes

$$\begin{aligned}\text{Discharge Rate} &= \frac{433 \text{ Gallons}}{1.0 \text{ Minutes}} \\ &= 433 \text{ gpm}\end{aligned}$$

High Flow - Straight Steam

Water Level Dropped 3.99

$$1.86 \times 211.5 = 844 \text{ Gallons}$$

Discharge Time = 1.0 Minutes

$$\begin{aligned}\text{Discharge Rate} &= \frac{844 \text{ gallons}}{1.0 \text{ Minutes}} \\ &= 844 \text{ gpm}\end{aligned}$$

Low Flow - Fog

Water Level Dropped 1.86

1.86 x 211.5 = 393 Gallons

Discharge Time = 1.0 Minutes

Discharge Rate = 393 Gallons
 1.0 Minutes

= 393 gpm

5. BUMPER TURRET DISCHARGE PATTERNS

a. P-4 400/800 N.A. Bumper Turret Discharge Pattern

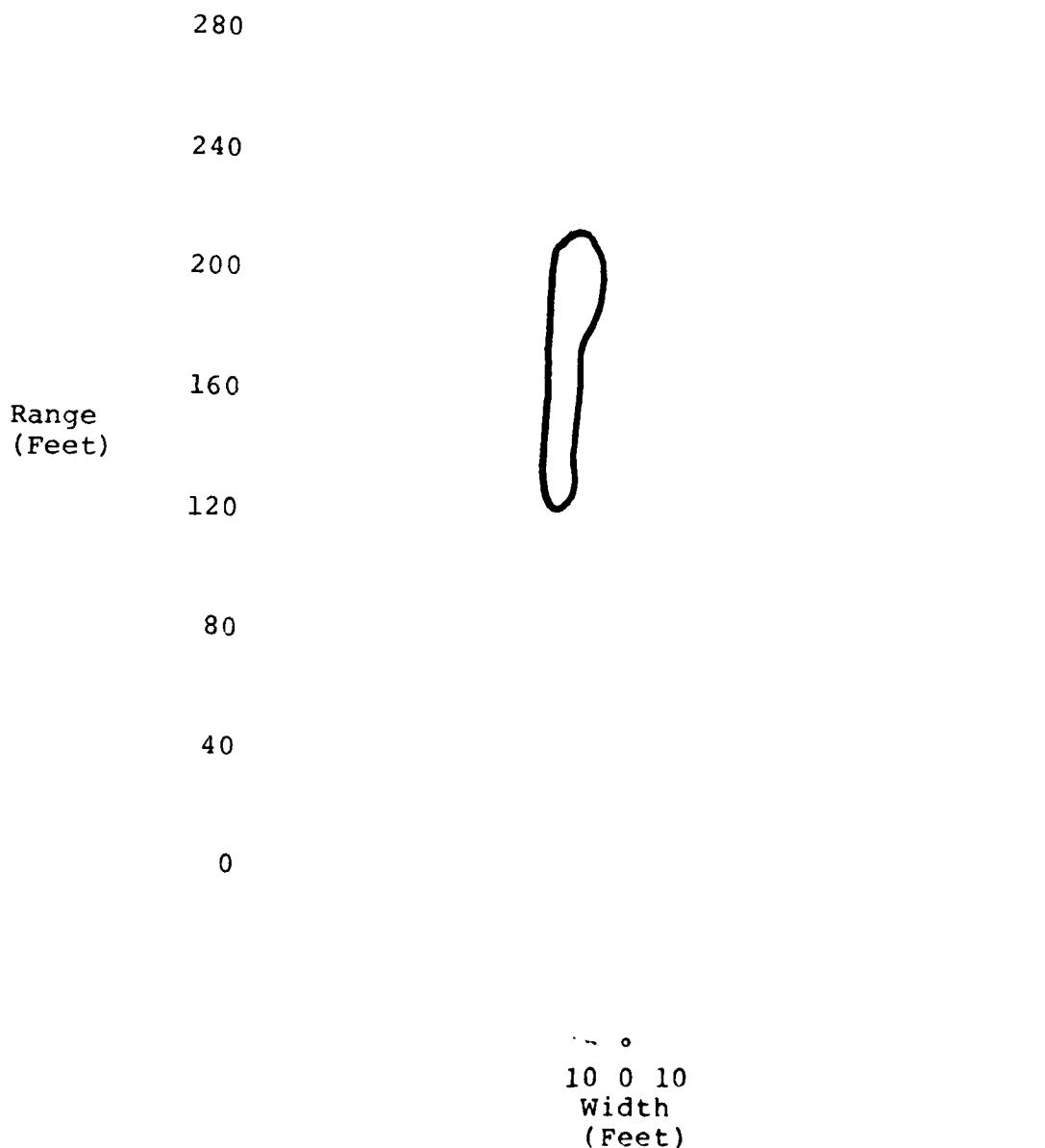
Water Discharge

Turret Pressure 240 PSI

Flow - 433 gpm

Straight Stream

Scale - 1/4 in = 10 ft



b. P-4 400/800 N.A. Bumper Turret Discharge Pattern

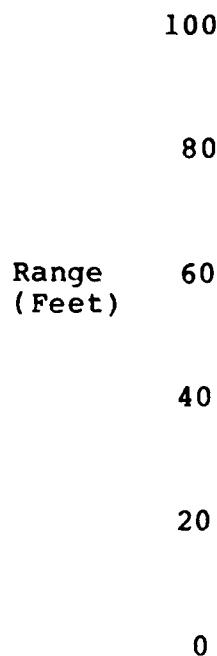
Foam Discharge

Turret Pressure 240 PSI

Flow - 393 GPM

Fog Pattern

Scale - 1/4 in = 5 ft



10 0 10
Width
(Feet)

10

c. P-4 400/800 N.A. Bumper Turret Discharge Pattern

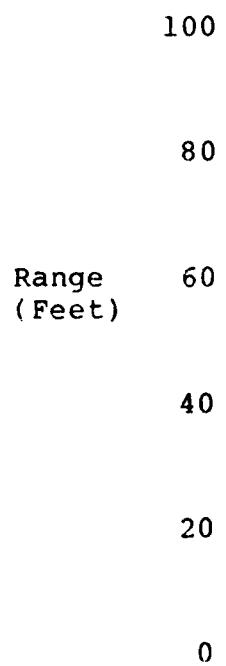
Foam Discharge

Turret Pressure 210 PSI

Flow 829 GPM

Fog Pattern

Scale - 1/4 in = 5 ft



10 0 10
Width
(Feet)

d. P-4 400/800 N.A. Bumper Turret Discharge Pattern

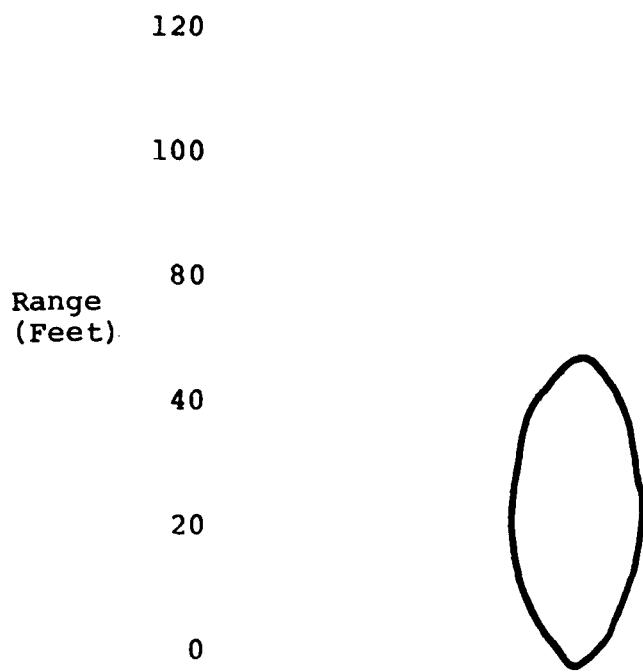
Water Discharge

Turret Pressure 240 PSI

Flow 393 GPM

Fog Pattern

Scale - 1/4 in = 5 ft



e. P-4 400/800 N.A. Bumper Turret Discharge Pattern

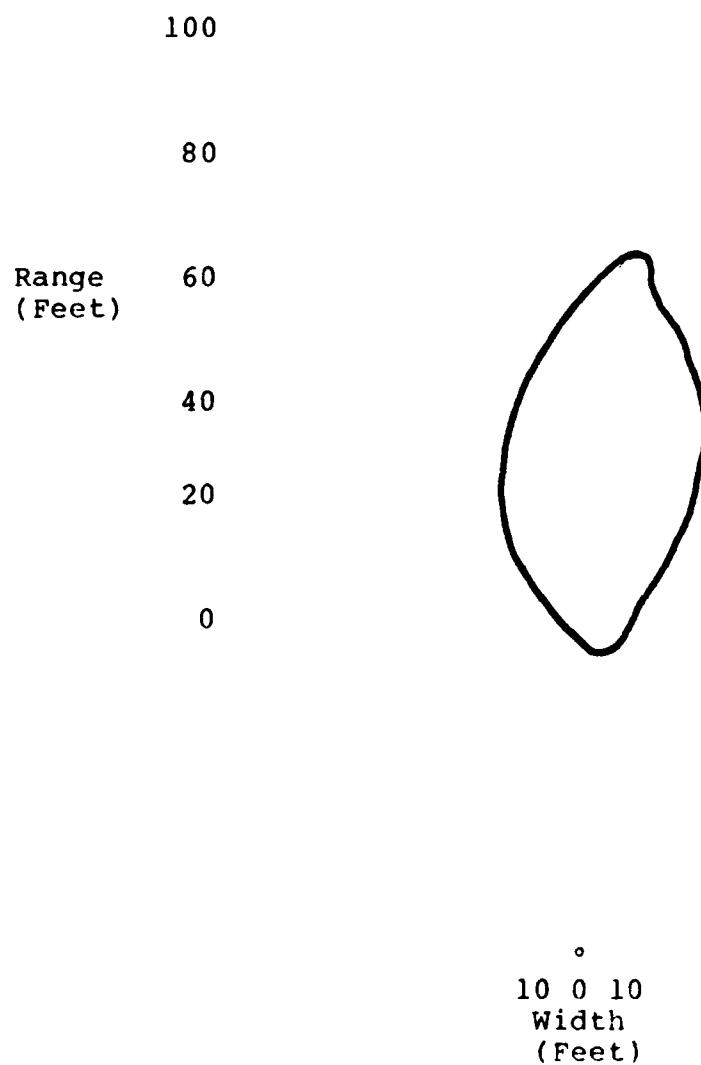
Water Discharge

Turret Pressure 210 PSI

Flow 829 GPM

Fog Pattern

Scale - 1/4 in = 5 ft



f. P-4 400/800 N.A. Bumper Turret Discharge Pattern

Water Discharge

Turret Pressure 210 PSI

Flow 843 GPM

Straight Stream

Scale - 1/4 in = 10 ft

280
240
200
160
Range
(Feet)
120

80
40
0



Wind Direction

•
10 0 10
Width
(Feet)

g. P-4 400/800 N.A. Bumper Turret Discharge Pattern

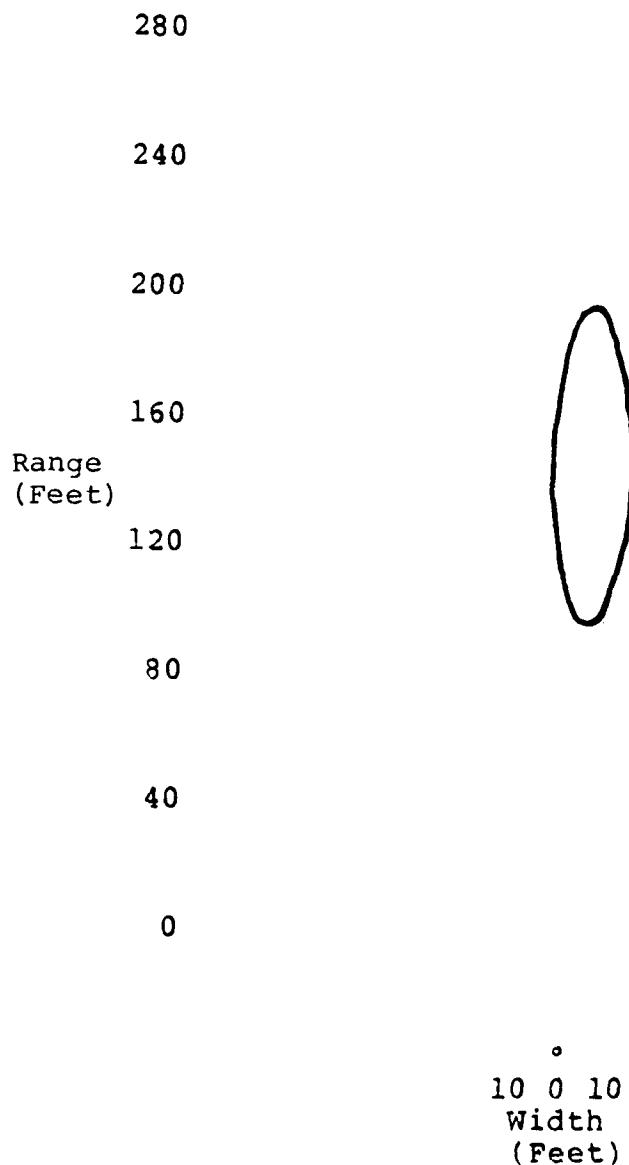
Foam Discharge

Turret Pressure 240 PSI

Flow 843 GPM

Straight Stream

Scale - 1/4 in = 10 ft



h. P-4 400/800 N.A. Bumper Turret Discharge Pattern

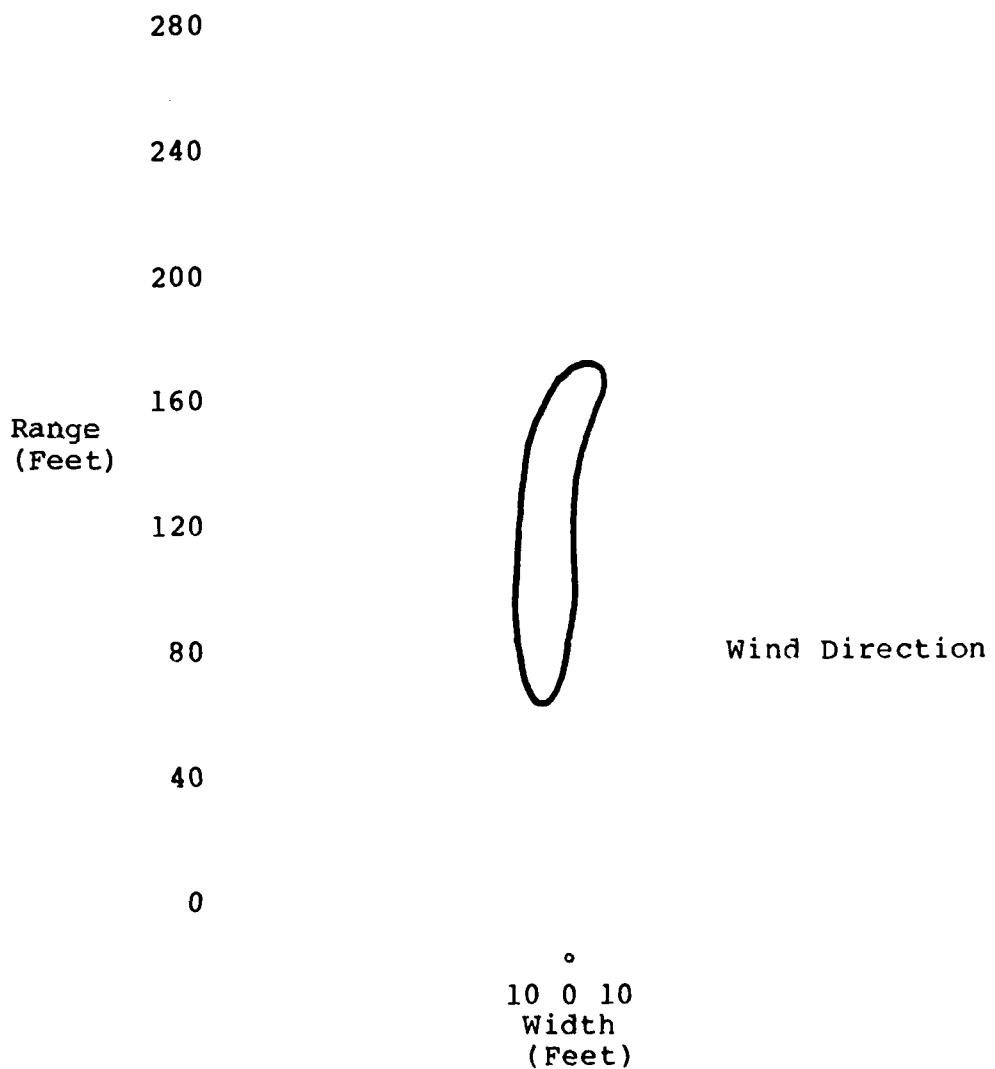
Foam Discharge

Turret Pressure 240 PSI

Flow 433 GPM

Straight Stream

Scale - 1/4 in = 10 ft



SECTION IV

P-4 AIR TRANSPORTABILITY MODIFICATION

1. REMOVAL OF ELECTRICAL COMPONENTS

- a. Remove FM transmitter and speaker wire from the rear.
- b. Remove the public address and siren amplifier from wire cluster and speaker wires from amplifier.
- c. Remove the speaker and mounting bracket from windshield wiper linkage cover.
- d. Remove amplifier mounting bracket.
- e. Remove switch mounted to bumper turret shutoff valve.

2. REMOVAL OF BUMPER TURRET

- a. Remove bumper turret locking cable housing from inside turret cover plate.
- b. Remove two inside cover plates.
- c. Disconnect the lines for the windshield flush (copper tubing) and windshield wash (rubber hose) at the tee connectors.
- d. Remove handle on bumper turret.
- e. Outside the truck, remove the turret locking linkage and nuts from cable and pull cable free from turret mounting plate.
- f. Outside the truck, remove the hold-down brackets for windshield flush on either side of the turret cover.
- g. Remove all the screws holding the cover on and remove cover.
- h. Inside the truck, disconnect the bumper turret feedline by unbolting the flange from base of turret, disconnecting the two block hoses attached to feedline's 45° elbow, and swinging hose into cab.
- i. Remove bolts from the bumper turret mounting bracket and remove the turret from truck.

3. ROOF TURRET REMOVAL

- a. Loosen the 1/4-turn fasteners around the outer edge of the roof turret control panel inside the cab and drop the panel down, giving access to the mechanism inside the panel.

b. Disconnect the cylinder piston rod from the rod end by loosening locknut and applying a wrench to the flats on the piston rod to unscrew rod from rod end.

c. Remove two long screws securing valve body.

d. Remove locknut from turret control shaft and remove gear from shaft.

e. Working from the cab roof, remove the screws securing the elevation control plate, and the flow rate and pattern control plates to the cab roof.

f. Unhook the large counterbalance springs on top of the turret barrels.

g. Remove the large locknut from the end of the turret head pivot shaft. Using a large socket wrench, remove hex locknut from shaft.

h. Remove two Woodruff keys from turret head pivot shaft. Using a large socket wrench, remove hex locknut from shaft.

i. Pull off the turret head and barrel assembly. The assembly can be handed down through the cab roof escape hatch, to a second man standing inside the cab.

j. Lift the turret body from the cab roof.

k. Remove roof turret locking control.

4. ROOF TURRET FEED DISASSEMBLY

a. Remove victaulic from inside of cab at roof.

b. On roof, remove cover on forward body compartment, exposing roof turret ration controller and remaining roof turret feed pipe.

c. Disconnect 4-inch victaulic coupling connecting feed pipe to controller by removing two attaching nuts and bolts.

d. The feed pipe can now be removed from inside the cab.

5. REMOVAL OF ROOF TURRET PIPE AND COVER

a. Release the hood latches from the turret pipe cover, and lift off the cover.

b. Remove four hexagon head bolts around the flange at each end of the pipe.

c. Lift off the pipe, being careful not to lose preformed packings under the flanges.

d. Install covers over roof turret pipe flanges. Covers are stored on cab roof.

e. The roof turret pipe and cover are stored on rear wall of cab, and secured by the rubber straps provided.

6. REMOVAL OF BEACON/SIREN ASSEMBLY

a. Remove the 14 screws which secure the base of the beacon/siren assembly to the top of the vehicle body.

b. Lift the beacon/siren assembly far enough to one side to gain access to the electrical leads underneath the unit.

c. Disconnect each lead at the quick-disconnect connector, and remove the beacon/siren assembly from the body.

7. REMOVAL OF WATER VENT

Remove the six bolts securing the rectangular vent flange and lift vent from truck.

8. REMOVAL OF FOAM VENT

a. Remove bolts holding support bracket and flange from foam tank.

b. Remove hose clamps from nipple drain.

c. Remove foam vent.

9. INSTALLATION OF WATER VENT

a. Place water vent with spring rods (long end) and ball into water tank vent opening.

b. Add stato-seals and flat washers and secure with existing bolts.

10. INSTALLATION OF FOAM VENT

a. Using existing bolts from the previous foam vent flange, place bolts though new flange, then through new gasket. Mount vent to flange on foam tank and secure with nuts and washers.

b. Remove hose from drain tube and slide it over foam drain nipple on truck. Then line up drain tube with drain hose and attach to nipple on tube. Secure both top and bottom hose clamps.

c. When the vent assembly is secured to the vehicle, seal where indicated with silicone rubber.

11. INSTALLATION OF FRONT BEACON LIGHT AND SPEAKER

The front beacon light and speaker are mounted on a single bracket. This bracket is mounted on the roof and bends downward between and above the left and right front windshields (see Figure 3).

a. Installation of Beacon Light and Speaker to Mounting Bracket.

(1) The speaker must be attached to the mounting bracket before the beacon light can be mounted. From the top of the bracket, drop four mounting bolts through the hole and hold the speaker up to the bottom of the bracket. Slide the bolts through the speaker bracket and secure so that the speaker is positioned forward of the truck. Make sure the wire lead from the speaker is long enough to connect to the speaker plug in the foam ladder compartment.

(2) Before mounting the beacon light, slide the two red wires through the grommet.

(3) The front beacon is then mounted on top of the bracket over the speaker, in the holes provided, using the three #8-32 bolts and attaching washers and locknuts.

b. Installation of Beacon and Speaker Mounting Bracket to Vehicle.

(1) The bracket mounts to the vehicle using five bolts and attaching nuts and washers. The back of the bracket uses existing bolt holes on roof with 5/8-inch long spacers, 1/4 - 20 x 1-3/4-inch long bolts, and attaching washers.

(2) The front of the bracket has two holes which can be used for a template. Drill through with a 9/32-inch clearance hole through the front roof gutter. Use 1/4 - 20 x 1-inch bolts and attach washers and nuts to finish, securing the bracket to roof.

(3) Connect one red wire from beacon to a ground on the mounting bracket. Connect the other lead to a longer length of single lead wire (see Figure 3).

12. INSTALLATION OF REAR BEACON

The rear beacon is attached to a mounting bracket (00786120) which is secured to the engine cover. This bracket is mounted between the spotlights on the rear of the truck.

a. Installation of Beacon Light to Mounting Bracket. Mount the beacon on the new light bracket in the same manner as it was mounted on the old bracket and secure, grounding one lead to base of beacon. Run the second wire through the grommet on mounting bracket.

b. Installation of Light Bracket to Vehicle.

(1) Locate centerline, L-R, on engine cover, approximately 1-1/2 inches from rear edge of engine cover position rear edge of bracket and center. Using mounting bracket as template inscribe four holes onto engine cover and drill through for 1/4-20 clearance. Then on center of four holes, drill one hole with 9/32-inch diameter grommet.

(2) One wire already being grounded, run the second wire through the grommet on engine cover. Make sure the wire extends long enough through cover to properly splice to longer wire provided. Run this wire as shown in illustration.

(3) With three loose leads now terminating at the forward body compartment cover on the roof, splice the front and rear beacon wires together, making a single lead. Connect this lead to the lead coming off the male quick-disconnect connector.

NOTE

The lead wires from the speaker should match up with the two lead wires from the male quick-disconnect connector. Make sure to use insulated wire connectors provided and further protect splices with electrical tape.

13. INSTALLATION of BUMPER TURRET

a. Increase clearance for bolts in mounting holes on bot om lip in front of truck.

b. Remove the old sealant around mounting surfaces in truck body.

c. Lift the turret and position to engage one bolt on side.

d. Place four bolts through bottom mounting holes adding nuts and washers. Begin to tighten so that the mounting plate rises, but leave it enough play to pivot.

e. Add the remaining side bolts but do not tighten until all are in place. Tighten bottom four bolts first.

f. Seal the joint where the mounting bracket and truck opening come in contact.

14. INSTALLATION OF BUMPER TURRET PIPING

The bumper turret uses the 4-inch ratio controller that previously fed the roof turret.

- a. Remove handrail support located between rear seats.
- b. On the roof, over the midsection, remove the cover exposing the 4-inch ratio controller.
- c. At the 4-inch ratio controller, connect a 90° victaulic elbow and position toward front of truck.
- d. Over the cab, install the cover plate with welded nipple and gasket to support the pipe hanger. Thread the top half of the hanger on the nipple.
- e. From inside the cab, slide the 4-inch victaulic pipe through the back wall between the seats until it is flush with the 4-inch elbow at the controller.
- f. Install the lower half of the pipe hanger and take up to facilitate the connection to the 4-inch victaulic elbow. Connect elbow to pipe.
- g. Connect 3-inch victaulic elbow to bottom of risen section.
- h. Remove recirculating hose tee from elbow on old bumper turret feedline, just upstream from shutoff valve.
- i. Attach recirculating hose tee onto new feedline shutoff valve assembly.
- j. Attach shutoff valve assembly to bumper turret base if not already attached.
- k. Connect welded feedline pipe to shutoff valve assembly piping.
- l. Rotate pipe until the back end is flush with the 3-inch victaulic elbow and the piping is resting against the floor drain valve guard.
- m. Tighten the victaulic and then tighten the pipe hanger so that the pipe is rigid.
- n. A few inches back from where the old bumper turret feedline comes through the floor, mark for drilling where a 4-inch "U" comes in contact with the floor. Make sure clearance is provided, with no obstructions underneath flooring of truck.

- o. Remove pipe and drill clearance holes for "U" bolt.
- p. Assemble the bumper turret foam shutoff switch to the bracket on the shutoff valve with the attaching screws and nuts. The valve handle should depress the button on the switch when in the shutoff position.

NOTE

For instructions on installing bumper turret tubing, see Figure 5.

SECTION V

P-4 AIR TRANSPORTABLE VEHICLE DESCRIPTION

The P-4 Air Transportable Vehicle is an AS/32 P-4 vehicle that has been modified so it can be driven into a C-130 aircraft without any disassembly. The foam and water vents have been redesigned so that they are no longer higher than the roof of the vehicle. The two rear flood lights have been lowered 1 inch. The beacon light has been relocated to a lower position between the two rear flood lights on the engine cover. The speaker has been relocated to the front of the truck above the windshield and installed just below another beacon light. The roof turret and feed pipe have been removed from the roof of the truck. The original P-4 Bumper Turret has been replaced by a larger capacity turret that is easier to operate.

1. HYDRAULIC BUMPER TURRET

The 400/800 N.A. Hydraulic Bumper Turret is a nonaspirating turret that mounts on the front of an AS/32 P-4 fire vehicle in place of the original P-4 Bumper Turret. The bumper turret can be operated either hydraulically or manually from inside the cab. The truck's 14-volt electrical system and 500 psi hydraulic system operate the turret's joystick control in the hydraulic mode.

On the discharge outlet of the turret is a sleeve. The sleeve slides up and down over the nozzle to vary the discharge pattern from a straight stream to a wide angle for pattern. The housing screw threads in and out to change the nozzle flow from 800 gpm to 400 gpm. The turret elevation can be varied from 60° above the horizontal to 15° below. The turret rotation can be varied from 85° to the left and right of the truck centerline.

The turret shutoff valve, located inside the cab, can be operated either hydraulically or manually. Either Aqueous Film-Forming Foam (AFFF) or water can be discharged from the turret.

2. TURRET CONTROLS

The turret controls are located inside the cab. The hydraulic directional control lever is located on the left-hand side of the turret. The lever controls the turret rotation and elevation. The button located on the lever handle is for interrupting the turret discharge. Two toggle switches are located just below the directional control lever. The upper switch operates the shutoff valve. The lower switch operates the bypass valve for the hydraulic system. A control plate is located to the right of the directional control lever and two toggle switches. On the control plate are a pressure gauge, two levers and two knobs. The pressure gauge reads the turret hydraulic pressure. The

lever just to the right of the gauge controls the discharge pattern. The lever to the right of the pattern control lever selects the flow rate of either 400 or 800 gpm. The 1/4-turn knob located just below the pressure gauge sets the turret in either the hydraulic or manual mode. The push-pull knob located just below the rate selector lever sets the shutoff valve in either the manual or hydraulic mode.

The turret shutoff valve is located to the right of the control plate. The manual shutoff handle is located on the top of the shutoff valve. Clipped to the turret feed pipe is the turret control handle. The turret control handle can be easily removed and installed into the turret handle holder for manual operation.

3. TURRET HYDRAULIC SYSTEM

The turret is powered by the truck hydraulic system. The system is activated by putting the agent selector in either the "Foam" or "Water" position. A bypass valve in the truck hydraulic system can be opened by a toggle switch to allow the oil to circulate when the bumper turret is not in hydraulic operation. The circulation of oil prevents the hydraulic pump from overheating. The turret shall have hydraulic pressure when the toggle switch is in the "ON" position.

SECTION VI

OPERATING PROCEDURES

1. HYDRAULIC OPERATION

a. Set rate selector on desired flow.

Rate: High Flow - 800

Low Flow - 400

b. Set pattern control for desired pattern.

c. Rotate "TURRET" decontrol valve, located on the lower left-hand corner of the control plate assembly, to the "hydraulic" position.

d. Push "DISCHARGE VALVE" decontrol valve, located to the right of the "TURRET" decontrol valve knob into the "HYDRAULIC" position.

e. Place "HYDRAULIC PRESSURE" toggle switch located below the hydraulic operating handle in the "ON" position.

f. Place agent selector (located on the equipment operator's control panel) in the desired position "FOAM" or "WATER." Hydraulic pressure system gauge located on the control plate assembly should indicate 500 psi.

g. Place the "DISCHARGE" toggle switch in the "ON" position to open the shutoff valve.

h. Aim the turret by moving the joystick:

Forward for depression

Backward for elevation

Left for Left

Right for right.

i. To interrupt the turret discharge, depress the button on the joystick handle. Release the button to resume discharging.

j. Change flow rate, push in the rate selector and the shutoff valve will automatically close. Then move the selector to either the top of the slot for high flow or the bottom of the slot for low flow and release the lever to resume discharging.

k. Adjust pattern selector for best fire control.

1. After fire suppression operation is completed, move discharge toggle switch to "CLOSE" position.

m. After returning to station, flush turret, proportioner, piping, handlines, etc., with plain water.

2. MANUAL OPERATION

a. Set rate selector on desired flow.

Rate: High flow - 800

Low Flow - 400

b. Set pattern control for desired pattern.

c. Rotate "Turret" decontrol valve, located on the lower left-hand corner of the control plate assembly to the "hydraulic" position.

d. Push "DISCHARGE VALVE" decontrol valve located to the right of the "TURRET" decontrol valve knob, into the "MANUAL" position.

e. Place "HYDRAULIC PRESSURE" toggle switch located below the hydraulic operating handle in the "OFF" position.

f. Pull the manual control handle from its stowed position on the feed pipe and slide into the handle holder on the turret (Figure 6).

g. Manually open discharge valve by rotating valve handle clockwise.

h. Aim turret with the manual control handle.

i. Adjust pattern control to the desired pattern for best fire control.

j. To change flow, close the discharge valve, then push in the rate selector and move to top for high flow or bottom of slot for low flow and release the lever. Then reopen the discharge valve.

k. After fire suppression operation is completed, shut off valve manually.

l. After returning to station, flush turret, proportioner, piping, handlines, etc., with plain water.

SECTION VII
MAINTENANCE AND TROUBLESHOOTING

1. PREVENTIVE MAINTENANCE

a. Thoroughly flush turret with plain water after each operation.

b. During periodic vehicle servicing, remove front and outside cover panels and check all mounting and nuts for tightness. Check all hydraulic connections for leakage. Check all wire connections for tightness.

c. Check all screws and nuts on nozzle for tightness.

d. All main turret seals are "O" rings as shown on parts identification drawings in the manual. When replacing "O" rings, lubricate and insert mating parts carefully to prevent cutting or damaging seals.

e. Periodically lubricate the two grease fittings in the nozzle assembly.

2. ROTATION ADJUSTMENT

a. Aligning the Turret and Manual Control Handle.

(1) Disconnect the chain by removing the clip from the master link and sliding the master link from the chain. Remove the chain from the column sprocket.

(2) Rotate the handle to point in the same direction as the turret.

(3) Reconnect the chain to the sprocket and reassemble the master link clip to the chain.

b. Aligning the turret and Rotation Actuator.

(1) Place the turret and Rotation Actuator.

(2) Rotate the turret to the driver's side as far as it can go.

(3) Loosen the four bolts that connect the rotation actuator to the mounting bracket and disengage actuator from the gear.

(4) From outside the cab, rotate the turret so that it is aiming about 5° off the front of the vehicle on the driver's side.

(5) Reengage the actuator with the gear and tighten the four actuator bolts.

(6) Manually rotate the turret completely to each side to be certain of a symmetrical 170°-rotation.

(7) If not, loosen the four actuator bolts again, disengage the actuator and rotate the turret so the gear moves one or two teeth in the correct direction and reengage the actuator, tighten the bolts and retest.

3. FLOW RATE SELECTOR ADJUSTMENT

The flow rate selector is designed to give two flow rates. High flow is preset @ 800 qpm and low flow @ 400 gpm. The flow is interrupted when the lever is with an electric switch. When the flow rate control handle is positioned in its slot, the control cable is pulled inward, bringing the tip housing screw inward. This allows the screw housing to move farther away from the tip button by a given distance, which is preset by button and linkage adjustment to give the high flow rate.

To achieve the low flow, the rate control handle is positioned down in its slot, pushing the screw outward, and turning the tip housing screw outward. This allows the screw housing to move closer to the tip button by a given distance, dependent upon the cable stroke.

a. High Flow Rate Adjustment.

(1) Place the low rate control handle in the downward position.

(2) From outside the vehicle, loosen the #8-32 socket setscrew that locks the cable to the cable control mount.

(3) Rotate the screw housing until it is 7/32 inch away from the bottom edge of the outside diameter of the button. If the 7-32 inch cannot be achieved without bending the cable too much, adjust the button.

(4) Lock the cable to the cable control mount with the #8-32 setscrew.

(5) Place rate selector cable in the "low flow" position.

(6) If the rate selector stroke is 1 3/8 inches, the low flow rate is correct. If the stroke is not correct, proceed to the "Low Flow Rate Adjustment procedures."

b. Button Adjustment.

(1) Remove button and attaching nut and lockwasher.

(2) Thread two nuts onto the shaft and lock them together so the shaft can be threaded in or out to achieve the 7/32 inch dimension.

(3) Remove the two nuts and reassemble the button with the attaching nut and lockwasher.

c. Low Flow Rate Adjustment.

(1) Remove the bumper turret shroud. (See "Removal of Bumper Turret")

(2) Loosen the two 1/4-20-inch round head screws to that the deflector control arm link is free to pivot.

(a) To lengthen the stroke, slide the deflector control arm link away from the pivot.

(3) Once the 1 3/8-inch stroke is achieved, lock the deflector control arm link in place by tightening the two 1/4-20-inch round head screws.

(4) Reassemble the shroud.

4. SHUTOFF VALVE ADJUSTMENT

The shutoff valve is adjusted properly when the valve handle is depressing the bumper turret foam button in the "SHUTOFF" position. To adjust:

a. Remove handle and attaching nut and washer from the valve.

b. Hydraulically, close the shutoff valve.

c. Pull the gear and key from the stem adapter.

d. Manually close the valve. The 5/16-inch diameter roll pin in the stem adapter is at right angles to the feed pipe when the valve is closed.

e. Reassemble the key, gear, handle, and attaching nut and washer to the valve.

5. REMOVAL OF NOZZLE ASSEMBLY

a. From inside the cab, place the rate selector in "HIGH" flow position.

- b. Place the pattern control in "MAXIMUM FOG" position.
- c. Remove the stop pin from the shroud slot.
- d. Remove 3/8-inch socket setscrew that attaches the pattern control cable to the shroud and slide the shroud off the cable.
- e. Remove the outer nut, that attaches the pattern control cable housing to the cable control mount, from the cable housing. Pull the cable from the mount.
- f. Remove the 8-32-inch setscrew that attaches the rate selector cable to the swivel.
- g. Remove the four screws that attach the tip to the head. Slide the tip from the rate selector cable but be careful not to lose the swivel.

6. TURRET HEAD REMOVAL

- a. Remove the nozzle from the head.
- b. Remove the "E" ring and pin that attaches the elevation link to the rod end located on the head.
- c. Remove the six attaching 1/4-20-inch screws and bearing cap from the head.
- d. Remove the 3/4-16-inch nut and washer from the turret head end of the elevation shaft.
- e. Slide the head from the elevation shaft.

7. REMOVAL OF TURRET BODY

- a. Remove the nozzle assembly from the turret.
- b. Remove the head from the turret.
- c. Remove the pivot bolt from the elevation shaft.
- d. Remove the 1/4-12-inch socket setscrew from the 1 1/4-12-inch nut on the bottom of the rotation tube.
- e. Remove the 1 1/4-12-inch nut from the bottom of the rotation tube, being careful the body does not slide off.
- f. Remove four attaching screws, the key and end cap from the body keeping pressure on the body against the base.
- g. Slide body from the rotation tube and shaft.

8. REMOVAL OF TURRET BASE

- a. Remove the turret shroud cover.
- b. Disconnect the chain by removing the clip from the master link and sliding the master link from the chain. Remove the chain from the sprockets.
- c. Remove 3/8-16-inch socket setscrew that attaches the pattern control cable to the shroud.
- d. Unthread the outer nut that attaches the pattern control cable to the cable control mount.
- e. Pull the pattern control cable from the cable control mount.
- f. Remove #8-32-socket setscrew from the swivel pin and cable control mount.
- g. Remove the attaching screws and the rate selector control cable bracket from the nozzle. Slide the cable from the cable control mount and swivel pin.
- h. Remove the body with head and nozzle assembly from the base.
- i. Remove 3/4-16-inch nut that attaches the elevation arm assembly to the elevation rod.
- j. Remove the 1/4-20-inch socket setscrew from the 1 1/4-12-inch nut on the top of the rotation tube.
- k. Remove the 1 1/4-12-inch key, and base sprocket nut, from the elevation tube. This will allow the elevation shaft and tube to drop from the base.
- l. Remove the six 5/16-18-inch screws and locknuts that attach the elbow flange assembly and the base.
- m. Remove the four 3/8-16-inch bolts that attach the base to the turret mounting bracket.
- n. Remove the six 1/4-20-inch screws that attach the controls mounting bracket to the base.
- o. Loosen four screws that attach the turret mounting bracket to the support brackets. This should provide enough play to slide the base and gasket from between the two mounting brackets.

9. DISCHARGE NOZZLE REASSEMBLY

a. Examine the #155 "O" ring that fits between the head and nozzle and replace if it is damaged. Lubricate the "O"ring before placing it on the nozzle.

b. Assemble the nozzle and cable bracket onto the head with the attaching screws and lockwashers.

NOTE

The bracket is assembled onto the rate selector cable housing.

c. Thread one of the two cable locking nuts onto the rate selector cable housing.

d. Place the swivel into the hole of the cable mount and slide the rate selector cable through cable bracket hole. Thread the second locking nut onto the rate selector cable. Then thread the cable through the swivel.

e. Thread one of the two cable locking nuts onto the pattern selector cable housing.

f. Slide the pattern selector cable through the hole in the control cable mount. Thread the second cable locking nut onto the pattern selector cable housing and lock in place. Slide the shroud over the cable.

g. Follow the procedure for adjusting the pattern control.

h. Follow the procedure for adjusting the flow rates.

10. TURRET HEAD REASSEMBLY

a. EXAMINE the two #20 "O" rings that assemble onto the elevation shaft and replace if they are damaged.

b. Grease and slide the shaft (key-way end first) through the large opening of the body and through the 1-inch diameter hole so that the shoulder on the shaft is flush with the boss on the body. Be careful not to damage the "O" ring during assembly.

c. Assemble the key; cap four attaching 1/4-20-inch x 3/4-inch socket head screws and the 3/4-16-inch nut onto the shaft.

d. Examine the #34 LCP "O" ring that fits on the bearing seal for damage and replace if necessary.

- e. Assemble the bearing seal and "O" ring into the head.
- f. Slide the bearing over the bearing seal.
- g. Examine the #429 "O" ring for damage and replace if necessary. Slide the "O" ring onto the body. (Do not lubricate; dust seal only)
- h. Examine the #155 LCR "O" ring that fits in the head and body and replace if necessary. Lubricate and assemble onto the head.
- i. Assemble the bearing and head onto the body and elevation shaft.
- j. Assemble 3/4-16-inch nut and lockwasher onto the end of the elevation shaft. Tighten until the head locks to body and then back off until the head can be moved without too much force.
- k. Using the six attaching screws and lockwashers, assemble the bearing cap onto the head.
- l. From the top, assemble the rod end bearing into the leg of the head as far as it can go. Lock the rod end in place with the jam nut.
- m. Slide the elevation pin through the elevation link and rod end and attach with the two attaching "E" rings.
- n. Assemble the nozzle assembly onto the head (see "Nozzle Reassembly").

11. BODY REASSEMBLY

- a. Examine the 126 "O" ring on the rotation tube and replace if necessary. Lubricate the "O" ring.
- b. Examine the 1429 "O" ring that fits between the body and mounting bracket and replace if necessary. Slide over the body. Do not lubricate; dust seal only.
- c. Examine the #155 LCR "O" ring that fits between the base and body and replace if necessary. Assemble onto the body.
- d. Assemble bearing that fits between the base and body onto the body.
- e. Being careful not to damage the "O" rings, slide the body over the rotation shaft and tube and attach with the key; cap four attaching screws and 1 1/4-12-inch nut. Tighten the nut so that the body locks to the base and then back off until the

body can pivot without too much force. Lock the nut in place with the 1/4-20-inch socket setscrew.

f. Thread the 7/12-20-inch nut and pivot bolt onto the rotation shaft.

g. Slide the elevation pin through the elevation link and pivot bolt and attach with the two attaching "E" rings.

h. Assemble the head onto the body (see "Head Reassembly").

12. BASE REASSEMBLY

a. Examine the #34 LCR "O" ring that fits between bearing seal and base and replace if damaged. Lubricate and assemble onto the bearing seal.

b. Slide the bearing seal into the cavity in the base.

c. Slide the bearing over the bearing seal in the base.

d. Place the gasket and base between the two mounting plates. Attach the base to the turret mounting plate, using the four 3/8-16-inch x 1-inch screws and lockwashers.

e. Examine the "O" ring that assembles between the inlet flange and base and replace if damaged; lubricate and assemble with the flange, base, and attaching screws and nuts.

f. Using the six 1/4-20-inch screws and lockwashers, attach the control mounting bracket to the base.

SECTION VIII

CONCLUSIONS

The modification of the AS32/P-4 crash rescue firefighting vehicle to a configuration which will allow the vehicle to be air transported on a C-130 aircraft, without disassembly of any equipment, was successful.

All requirements of the statement of work (SOW) for the air transportable P-4 were met or exceeded during the tests conducted. The roof turret and agent feed pipe was removed from the roof of the vehicle. The original bumper turret was replaced by a large capacity (800 GPM) non-air-aspirating turret. This large capacity turret can be operated either hydraulically or manually from inside the cab.

This system provides an air transportable fire suppression capability superior to the assembly/disassembly method previously available.

APPENDIX A
AS32/P-4 AIR TRANSPORTABILITY DRAWINGS

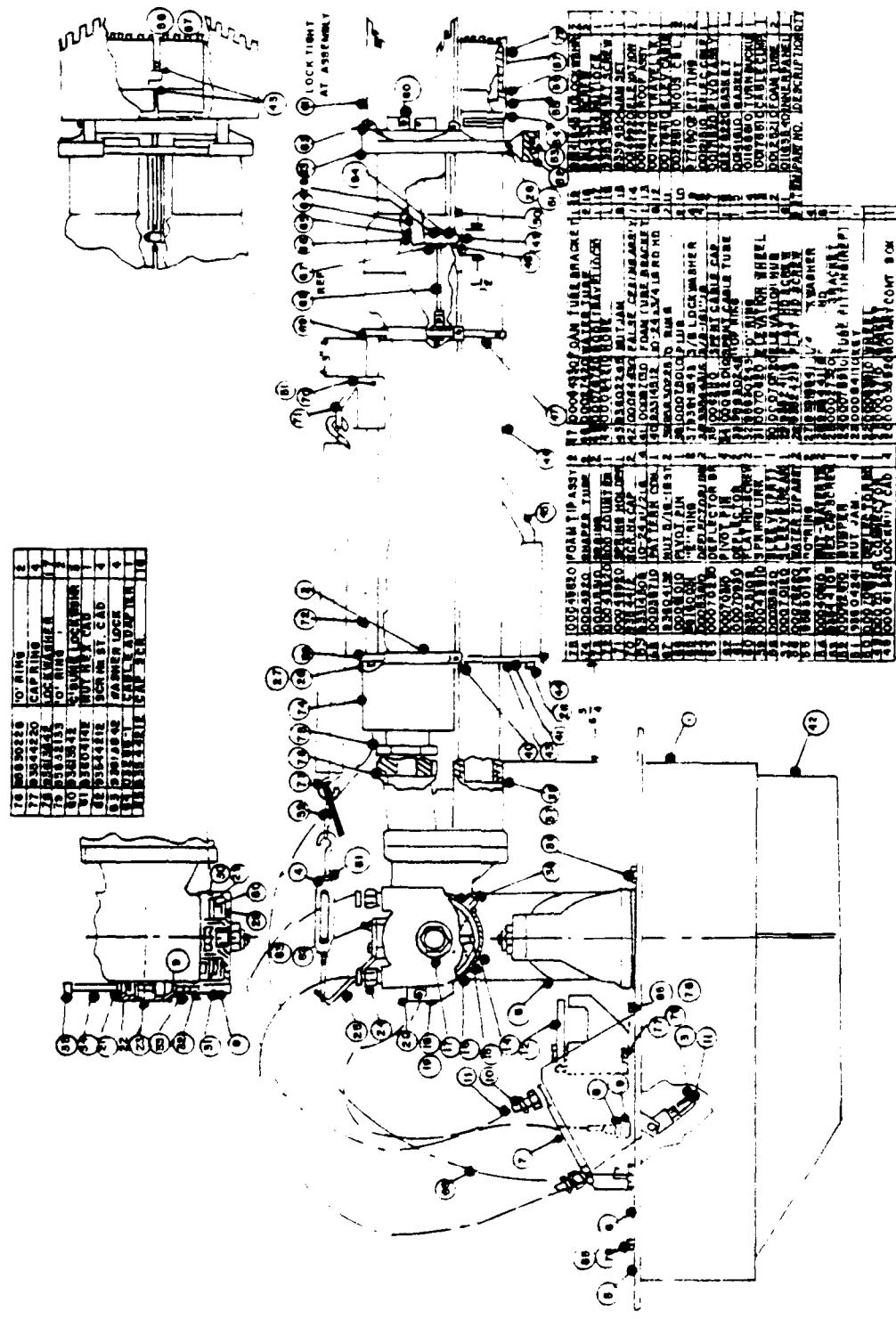


Figure 1 P-4 Roof Turret Assembly

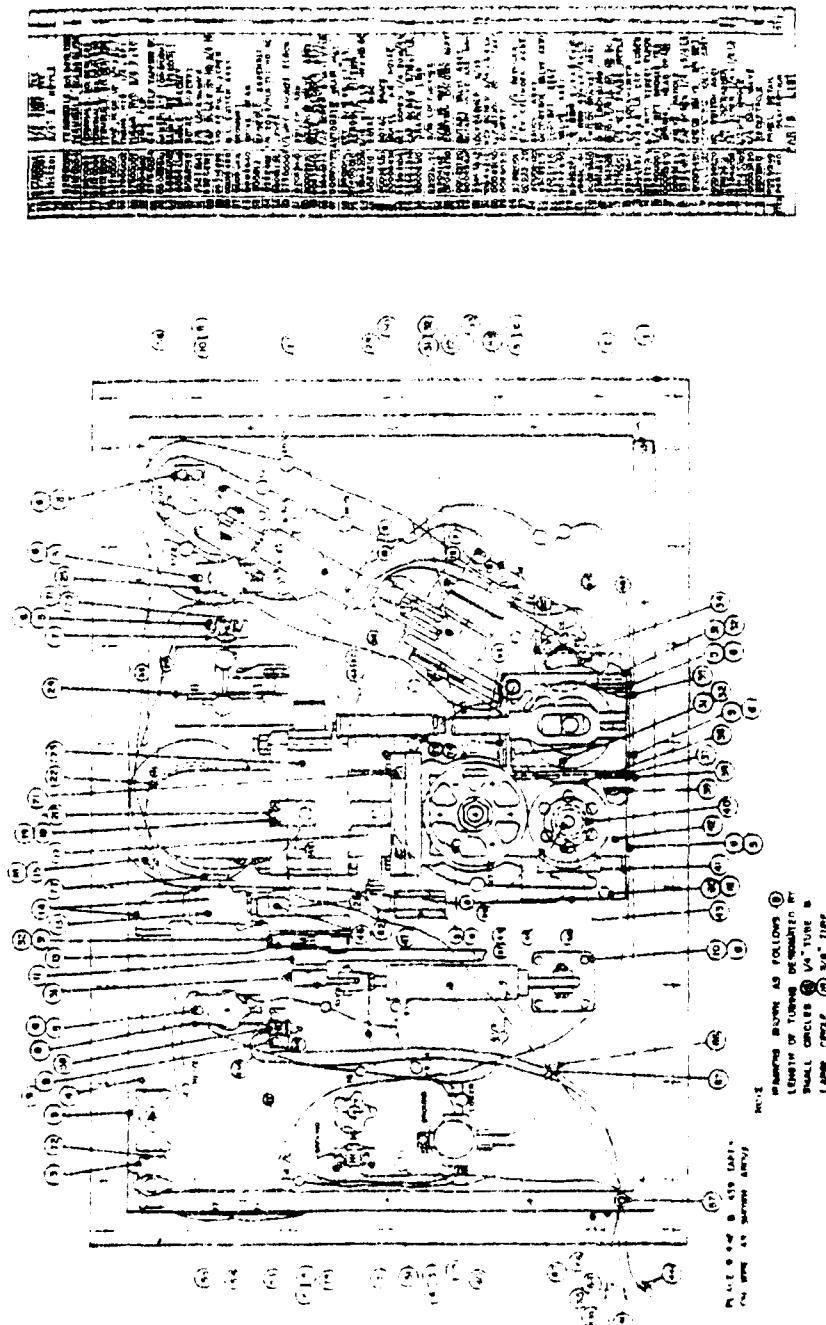


Figure 2 P-4 Bumper Turret Inner Panel Assembly

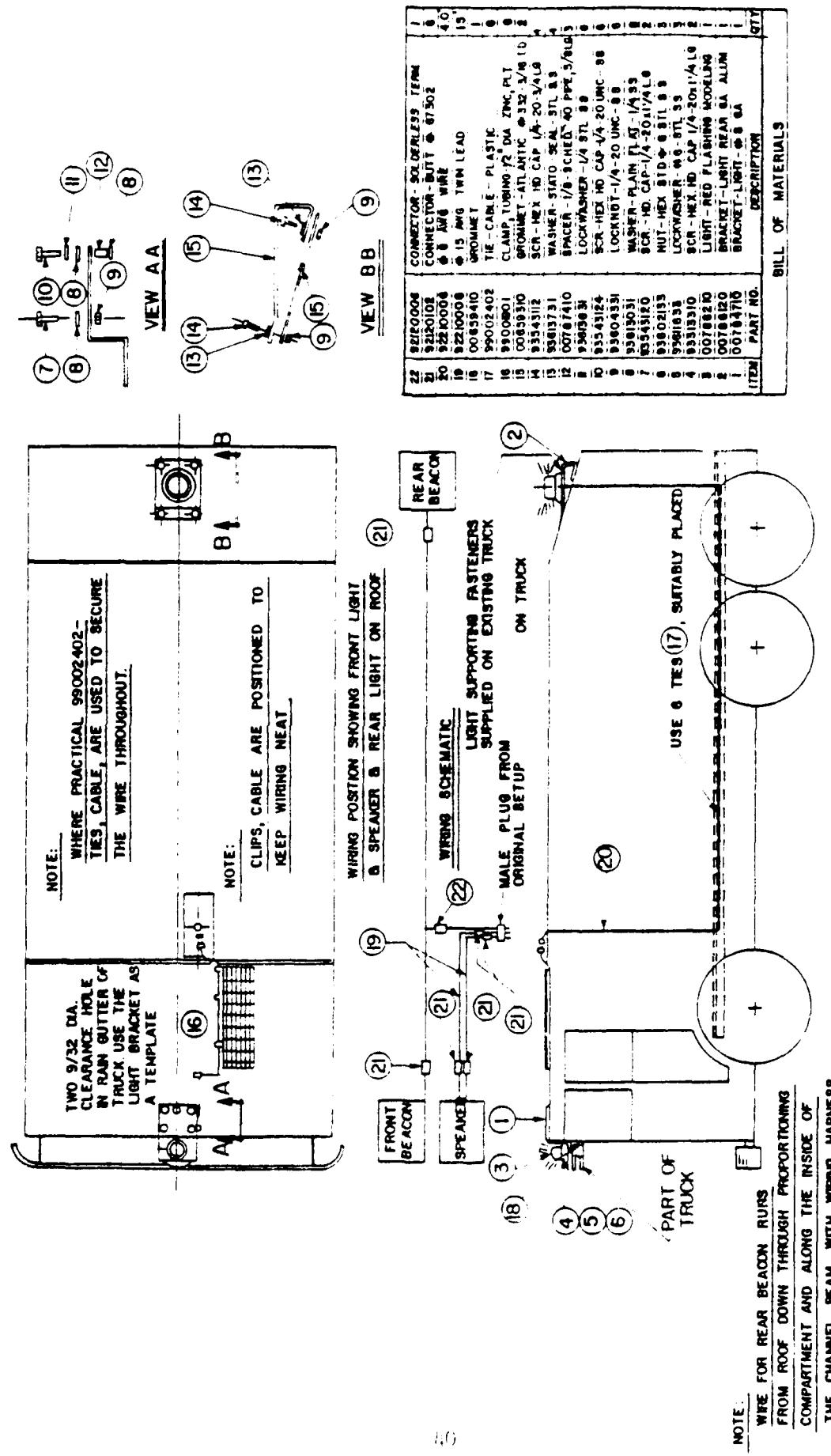


Figure 3 P-4 Speaker & Beacon Lights Wiring Assembly

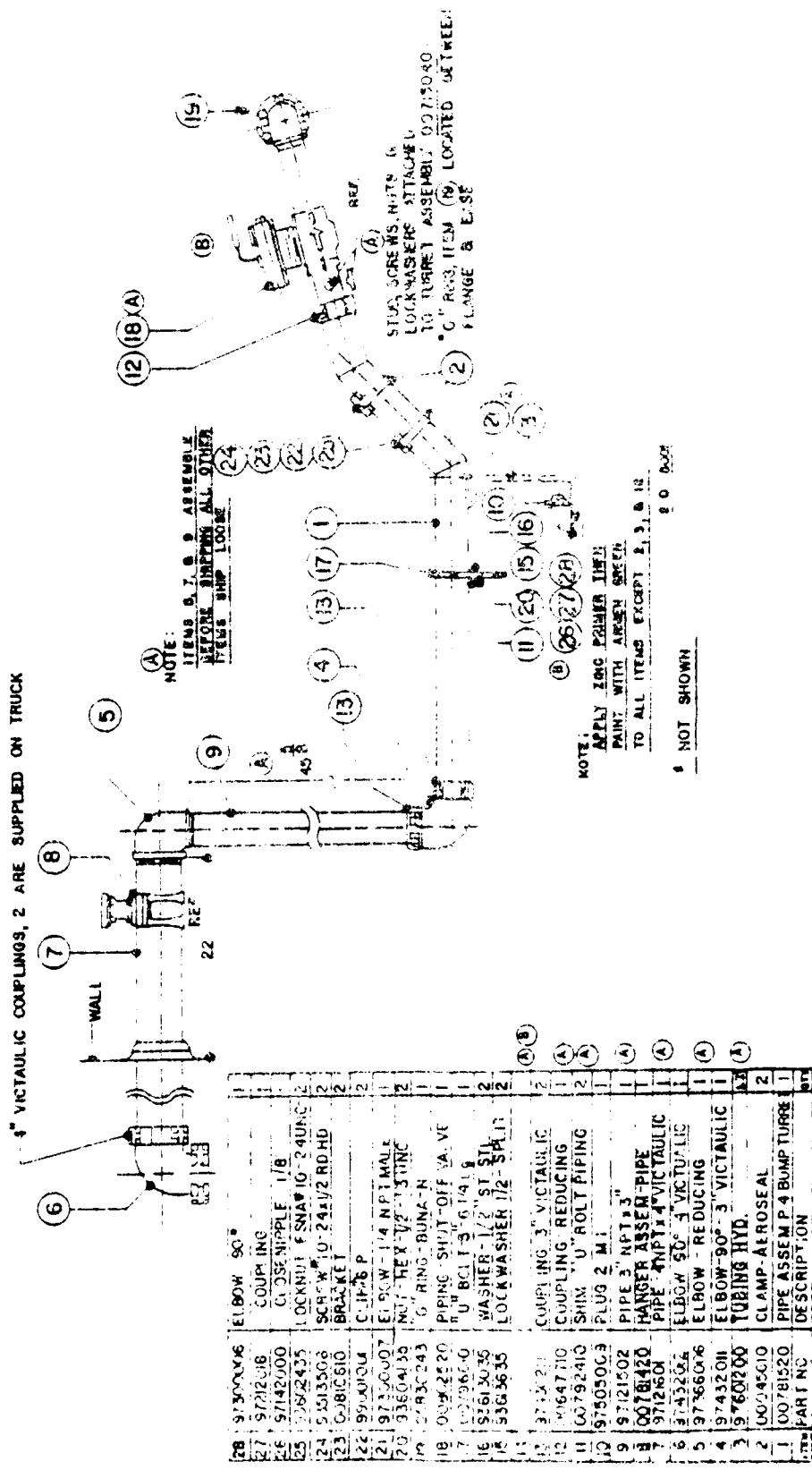


Figure 4 P-4 Bumper Turret Piping Assembly

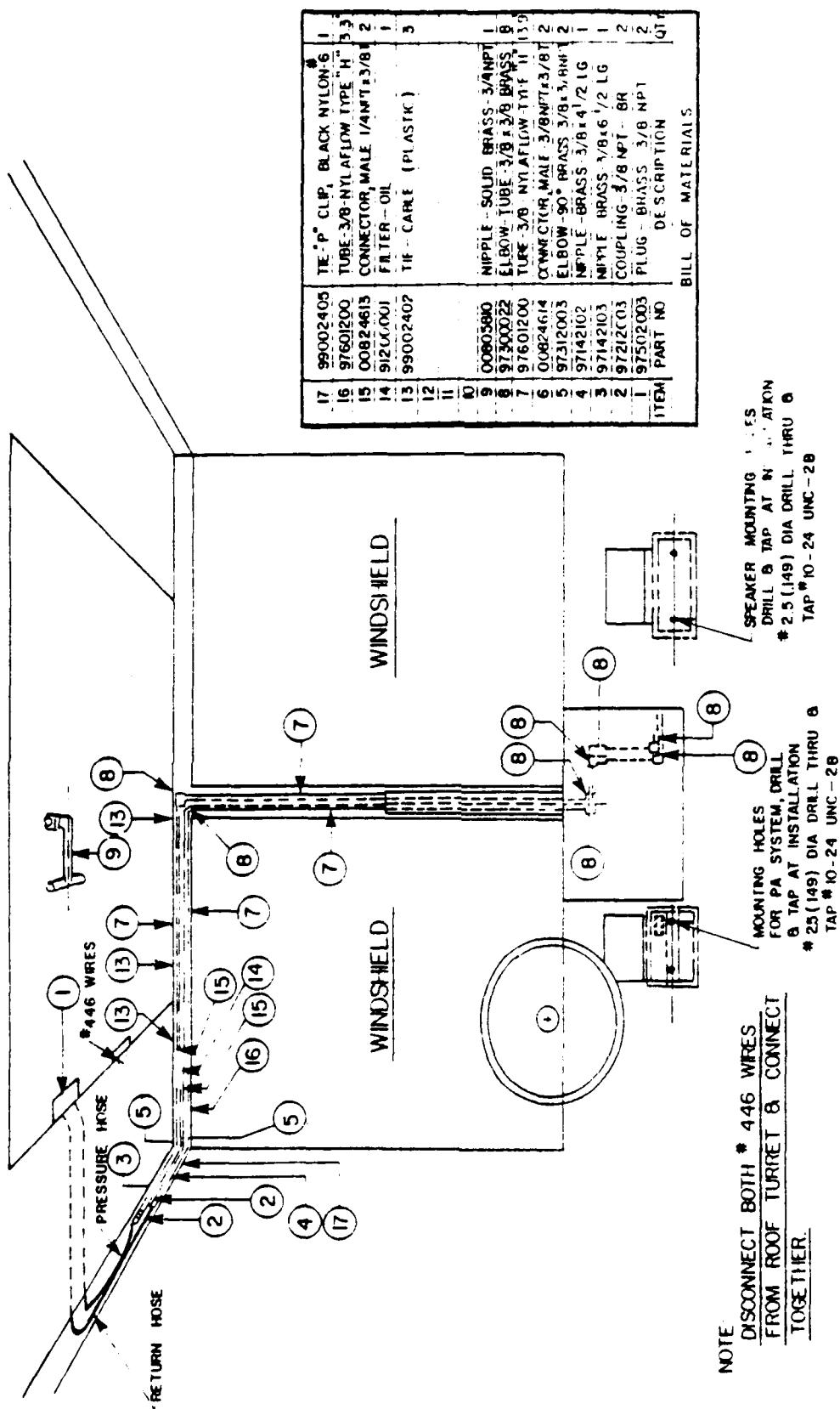


Figure 5 P-4 Roof Turret Modification Kit

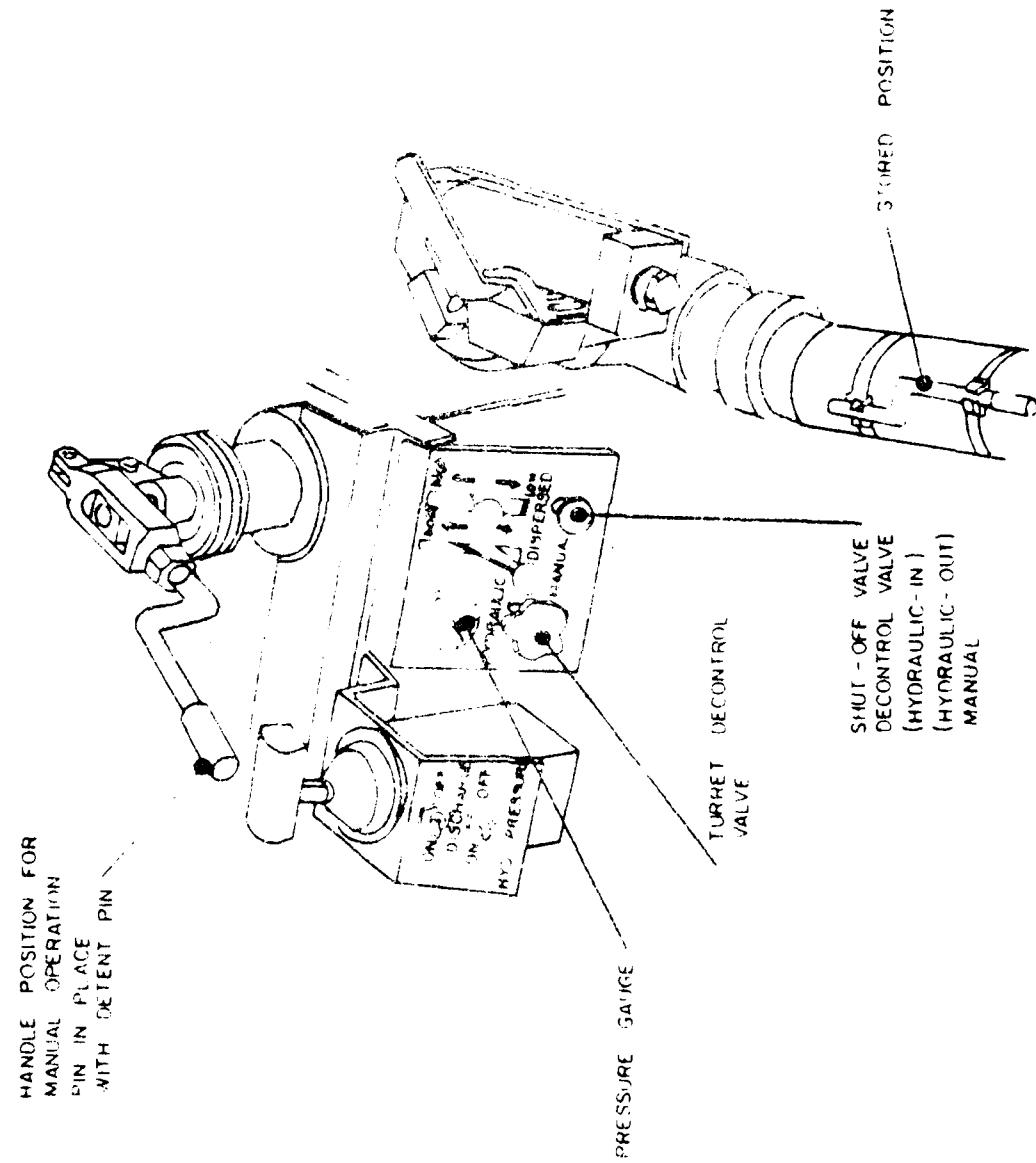


Figure 6 Turret Controls

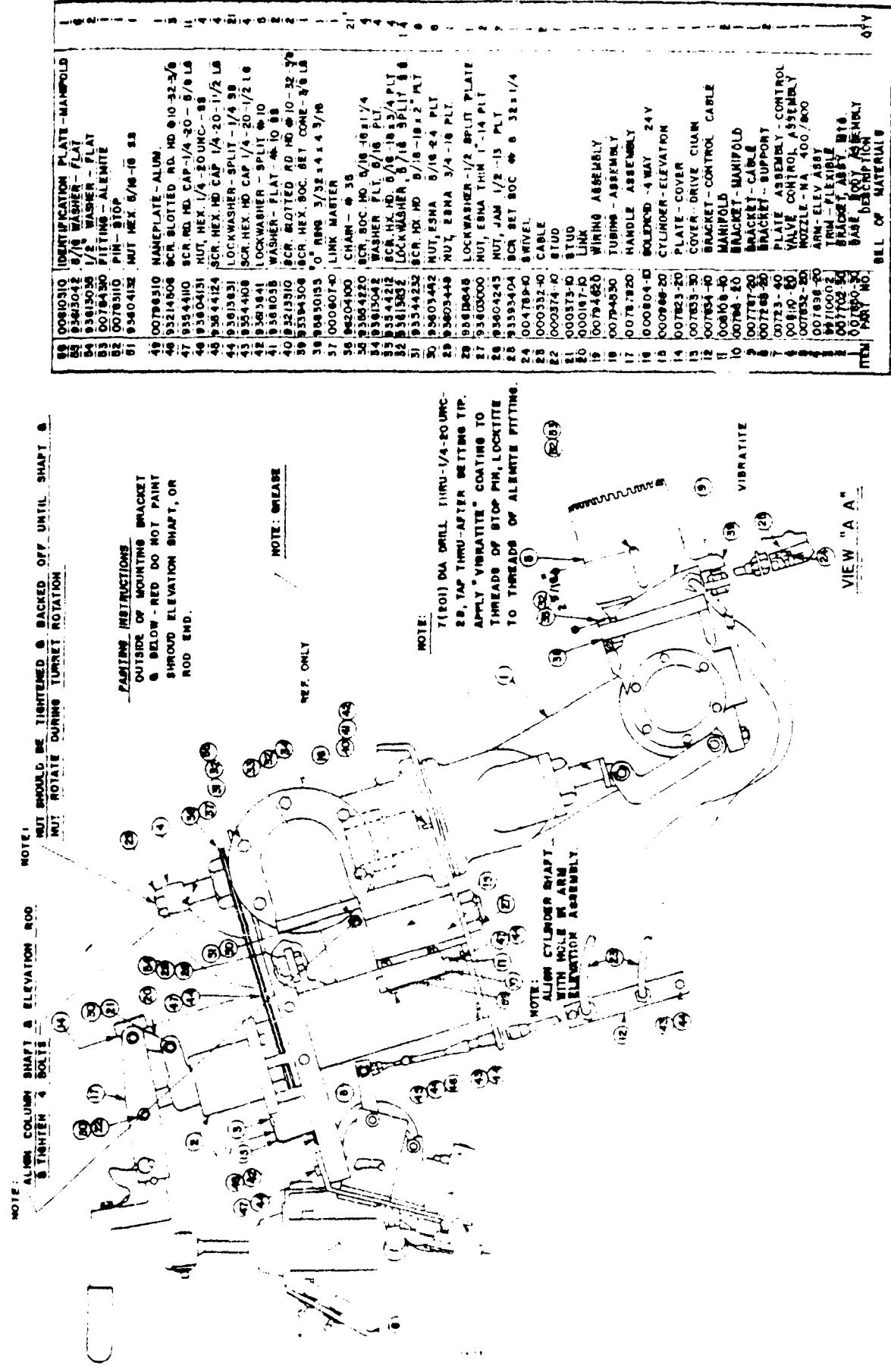
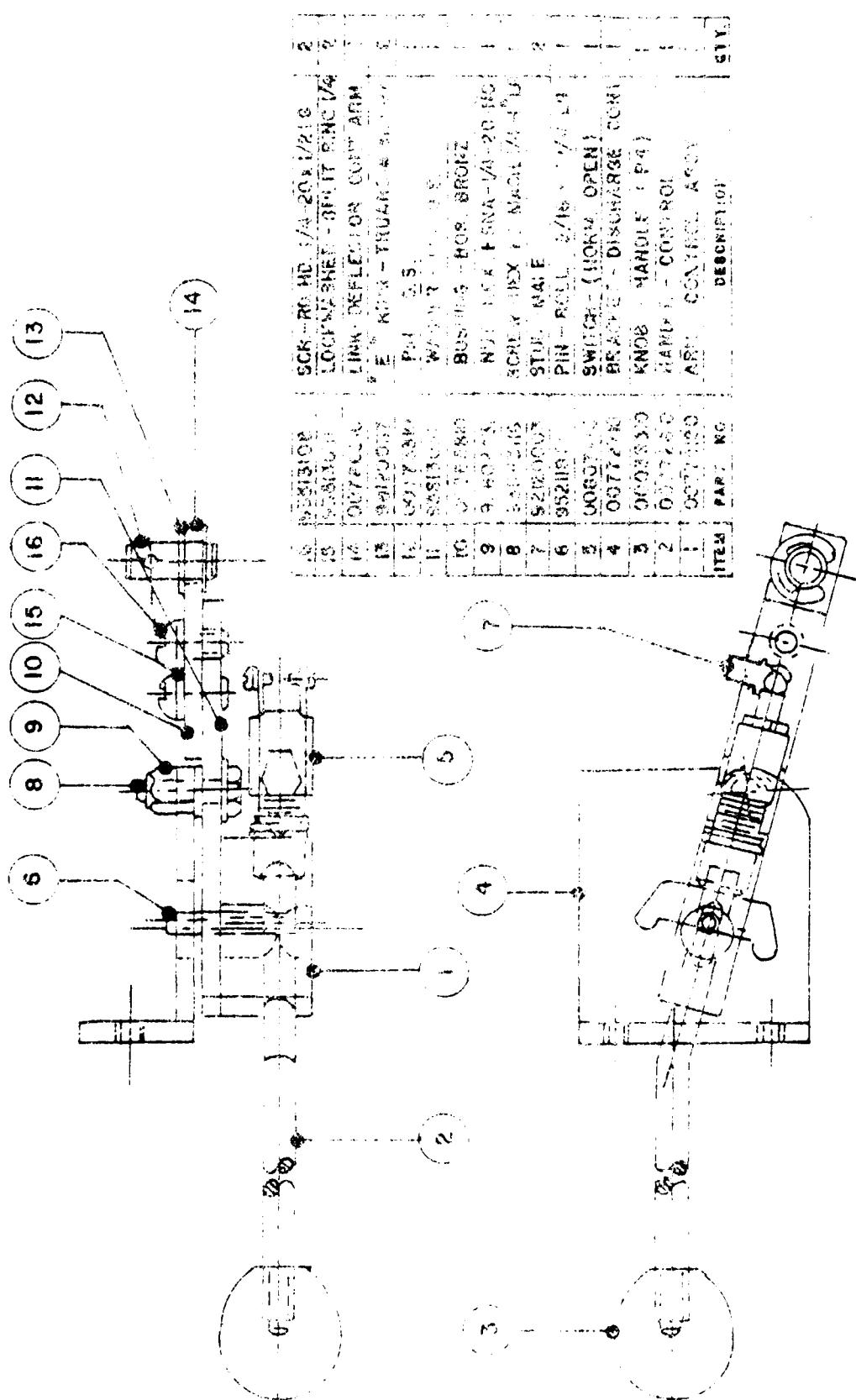


Figure 7 Bumper Turret



NOTES:

CONTROL SHOWN UPSIDE DOWN

Figure 8 Discharge Control Assembly

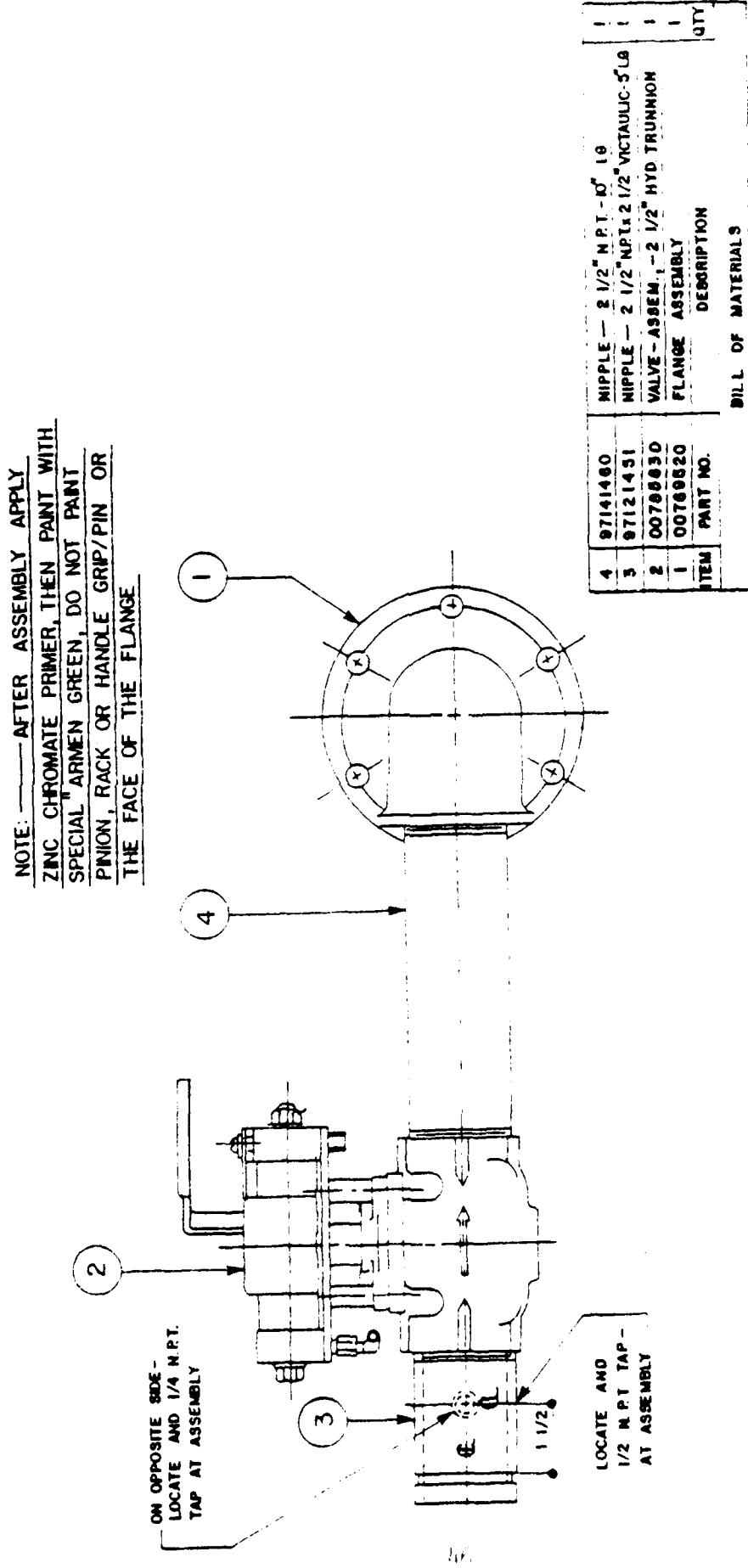
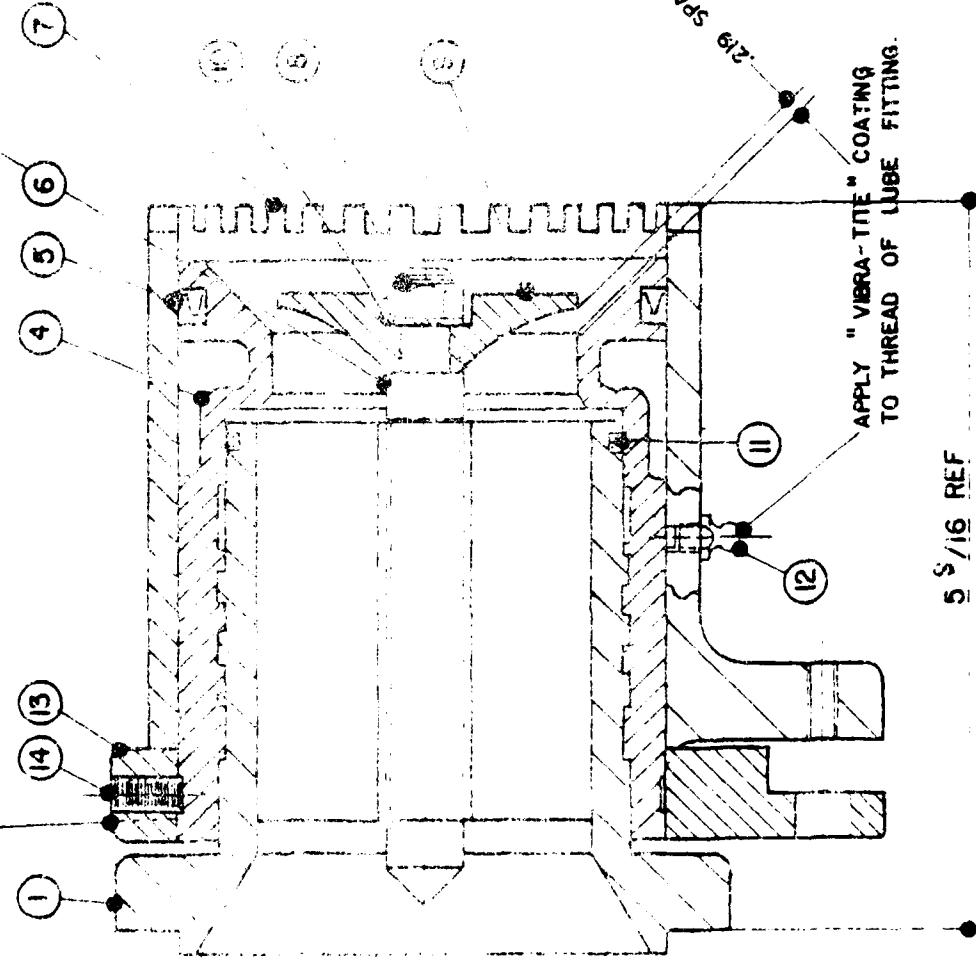


Figure 9 Shutoff Valve Assembly

NOTE: BUILD THIS ASSEMBLY ONTO FINAL TURRET ASSEMBLY & NOT BEFOREHAND.

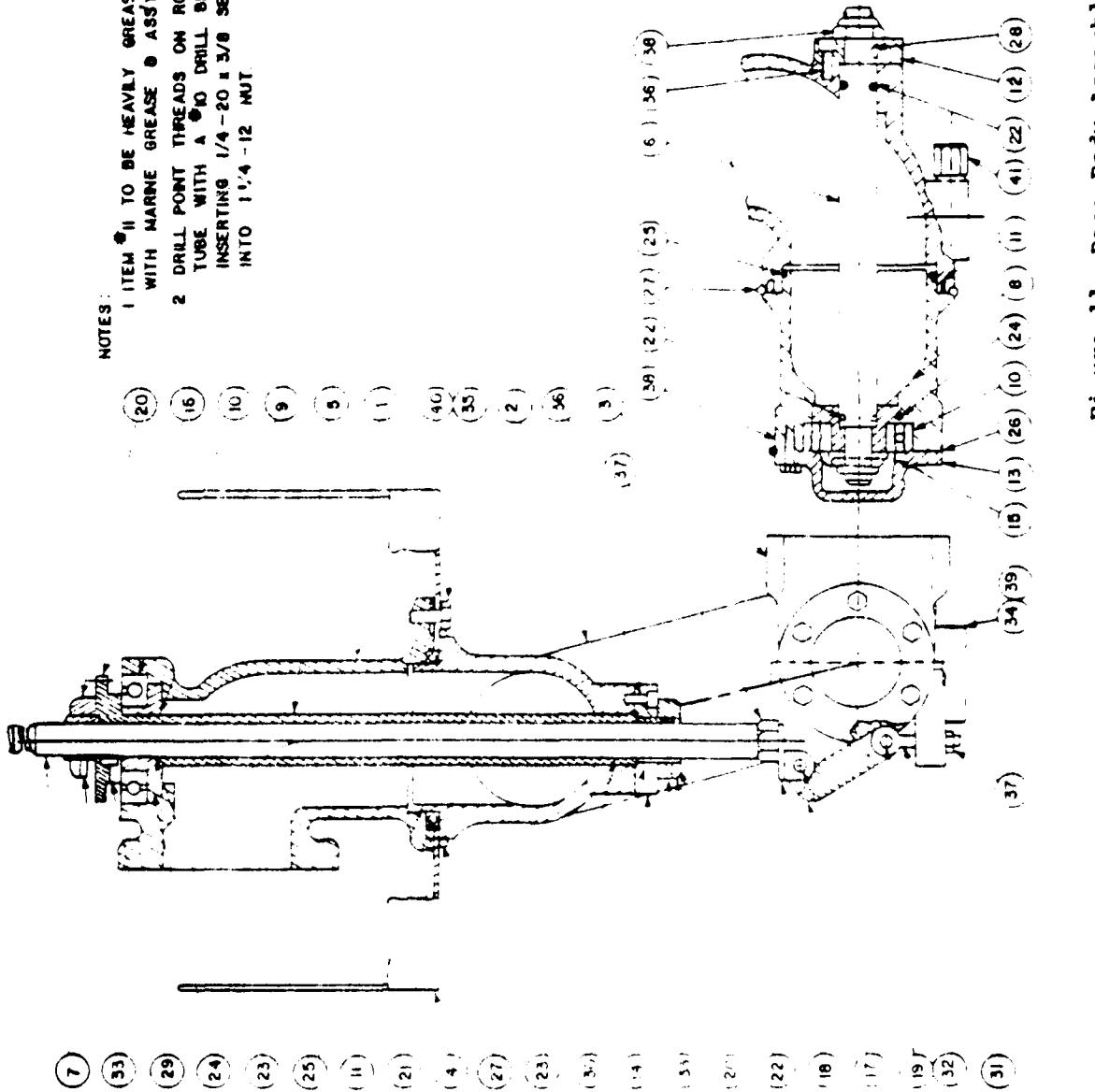
SHOWN 45° OUT OF POSITION.
APPLY "VIBRA-TITE" COATING
TO THREADS.

LOCKTITE SHAFT



ITEM NO.	DESCRIPTION	QUANTITY
1	93325A S SUB-LOC SET CLIP H/LS 16-1/2	4
2	100445 ASSTNT - CONTHC CABLE	4
3	357234 FLNG - 1/4" FFL	1
4	355305 REG - 3/8" 1/4" 250	1
5	258133A WASHER - 5/8" STAINLESS	1
6	637360N 45-104	1
7	258133A SLIPFIT	1
8	355305 REG - 3/8" 1/4" 250	1
9	258133A WASHER - 5/8" STAINLESS	1
10	45-104	1
11	258133A SLIPFIT	1
12	355305 REG - 3/8" 1/4" 250	1
13	258133A WASHER - 5/8" STAINLESS	1
14	45-104	1

Figure 10 Nozzle Assembly



ITEM	DESCRIPTION	QTY
41	VALVE - DRAIN	1
40	LOCKWASHER - 3/8 SPLIT	63
39	LOCKWASHER - 1/4 SPLIT	98
38	MUT. FANA 3/4 X 15 PLT	1
37	MUT. HX JAM 7/16 - 20 PLT	1
36	SCN HX HD 1/4 - 20 X 3/4 SS	1
35	SCN HX HD 1/4 - 20 X 3/4 SS	1
34	SCN HX HD 1/4 - 20 X 3/4 SS	1
33	SCN SET SOC 1/4 - 20 X 3/4 PL	1
32	E RING 6135-37 PLT	1
31	ROD END T 1/4 - 20 MALE	1
30	KEY 5/16 SQ AL 2 LA	58
29	KEY 1/16 SQ AL 2 LA	84
28	KEY 1/16 SQ AL 2 LA	84
27	KEY 3 WOODRUF	64
26	O RING - 420 BUNA-N	1
25	O RING - 242 BUNA-N	1
24	O RING - 193 LCB	1
23	O RING - 034 LCB	1
22	O RING - 028 BUNA-N	1
21	O RING - G20 BUNA-N	1
20	O RING - 242 BUNA-N	1
19	PIN ELEVATION	2
18	SOLT - PIVOT	2
17	LINK - ELEVATION	2
16	SPROCKET - BASE	1
15	WASHER	1
14	CAP	1
13	CAP - BEARING	1
12	CAP	1
11	BEARING KATON	1
10	BEARING	1
9	SEAL BEARING (BASE)	1
8	SEAL BEARING (HEAD)	1
7	ROD ELEVATION	1
6	SHAFT ELEVATION	1
5	TUBE - ROTATION ASSY	1
4	BRACKET - ELEVATING	1
3	HEAD	1
2	BODY	1
1	BASE	1
ITEM	PART NO.	DESCRIPTION
		BILL OF MATERIALS

Figure 11 Base Body Assembly

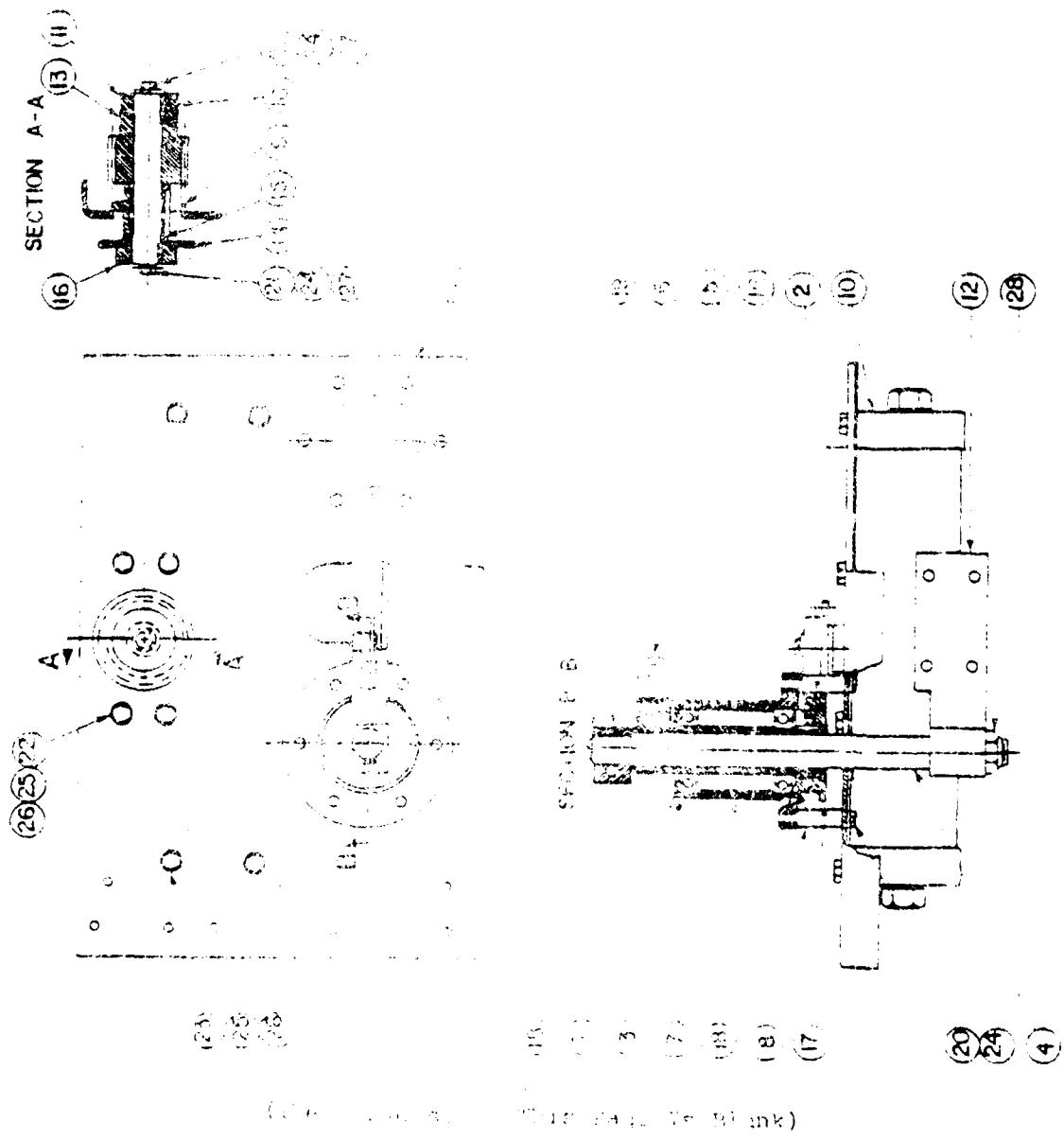


Figure 12 Mounting Brackets Assembly

APPENDIX B

AS32/P-4 AIR TRANSPORTABILITY BILL OF MATERIALS

P-4 AIR TRANSPORTABILITY CONVERSION KIT
BILL OF MATERIAL
PART NO. 007980 - 10

ITEM P/N	SUB. ASSY.	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00718040						TURRET SUMMER AFF 800 GM HYD	-
					007880-30	BASE BODY ASSY	-
					007702-30	BRACKET ASSY. - MTO.	-
					937100-020	TRIM - FLEXIBLE	-
					007688-20	ARM - ELEV. ASSY.	-
					007682-20	NOZZLE N.A. 400/600	-
					008110-20	VALVE CONTROL ASSY	-
					007723-40	PLATE ASSY - CONTROL	2
					007269-20	BRACKET - SUPPORT	2
					007787-20	BRACKET - CABLE	-
					007784-20	BRACKET - MANIFOLD	-
					008108-10	MANIFOLD	2
					007834-10	BRACKET - CONTROL - CABLE	-
					007833-50	COVER DRIVE CHAIN	-
					007723-20	PLATE - COVER	-
					000508-20	CYLINDER - ELEVATION	-
					000504-10	BOLINOID - 4-WAY 24V	-
					001878-20	HANDLE ASSY	-
					007843-30	TUBING ASSY	-
					007946-20	WIRING ASSY	-
					000017-0	LINK	-
					0000173-0	STUD	2
					000074-10	STUD	-
					0000882-10	CABLE	2
					004789-10	SWIVEL	-
					938864-040	SCR SET SOC. # 6-32 X 1/4	-
					938603-2410	NUT - JAN 1/2 - 13 PLT	2
					938030-020	HUT - ESHA TIN T-14 PLT	-
					9981384-00	LOCK WASHER 1/2 SPLIT PLT	-
					93863-4180	NUT USNA 3/4 - 16 PLT	-
					938603-4420	NUT USNA 5/16 - 24 PLT	6
					93864-2120	SCREW NYX 1/4 X 1 1/2 PLT	6
					9981383-20	LOCKWASHER 1/4 X 1 1/2 PLT	6
					93864-2120	SCH. HEX. HD. 5/16-1013/4 PLT	14
					938130-4200	WASHER PLT. 6/16 PLT	6
					988842-200	SCR. SOC. HD. 5/16-101 1/4 PLT.	6

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB. ASSY	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00718040 (CONT)					96204000	CHAIN 4-38	26
					0079807-10	LINK - MASTEN	-
					91690650	O RING 3/2 X 1-4-3/16	-
					916940980	SCR. IN. SOCI SET CONN FT 3/8-16	-
					932156100	SCR. SLOTTED ND. HD. 10-32 U/T	2
					936110380	WASHER PLAT 4X 10 SS	2
					936156410	LOCKWASHER - SPLIT 10	3
					936441080	SCR. HEX. ND. CAP 1/4-20-1/2 L6	4
					936463910	LOCKWASHER SPLIT 1/4 SS	2
					938441240	SCR. HEX. ND. CAP 1/4-20-1/2 L6	4
					939041310	MUT. HEX. 1/4-20 UNC - 88	4
					939441100	SCR. HEX. ND. CAP 1/4-20-88 L6	1
					932146300	SCR. SLOTTED RD. RD. 10-32-3/16	3
					0079806100	NAMEPLATE - ALUM	-
					9300741310	NUT. HEX 5/16 - 18 3/8	-
					007931-10	PIN - STOP	-
					007173-10	FITTING - ALUMINUM	-
					830130393	1/2 WASHER - PLAT	-
					926130420	8/16 WASHER - PLAT	6
					0078640	IDENTIFICATION PLATE - MANIFOLD	1
					00788030	BASE - BODY ASSEMBLY	-
					007882-40	BASE	-
					006909-40	BODY	-
					006891-20	BODY	-
					007716-40	HEAD	-
					007716-40	BRACKET - MOUNTING	-
					017777-20	TUBE - ROTATION ASY.	-
					007869-20	SHAFT - ELEVATION	-
					007707-20	NUD - ELEVATION	-
					000913-20	SEAL - BEARING (HEAD)	2
					000912-20	SEAL - BEARING (BASE)	2
					000070-10	BEARING	-
					940100390	BEARING - KEYDOWN	2
					000070-10	CAP - BEARING	-
					000070-20	CAP - BEARING	-
					001069-10	CAP	-

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB. ASS'Y	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00716040	007980-00					BASE BODY ASS'Y	-
	(CONT.)					WASHER	-
					000004410	SHROCKET - BASE	10
					007709-20	LINK-ELEVATION	
					007708-10	BOLT-PIVOT	
					001098-10	PIN-ELEVATION	
					001738-10	NUT 1/2-12	
					001215-20	GASKET-BASE	
					9663000200	O RING - 020 DUNA-N	3
					9663000200	O RING - 024 DUNA-N	2
					966300040	O RING - 034 LCN	2
					966300080	O RING - 168 LCN	2
					980202420	O RING - 242 DUNA-N	2
					911127320	O RING - 252 DUNA-N	2
					980200010	KEY - A WOODRUFF S.S.	
					980200010	KEY 1/16" SQ 1/16" LG. S.S.	
					980200000	KEY 3/16" 1/12 LG. S.S.	
					980200010	KEY END 7/16-20 MALE	
					980200010	8 RING BISS - 87 PLT.	
					980200020	SCR BE TSOC 174-201 3/8 SPLT.	
					986431120	SCREW HD 1/4-20H 3/8	
					935138180	SCR HD 1/4-1618 S.	
					916831120	SCR SOC HD 1/4-20PL 1/8 S.	
					980032440	NUT H JAN 7/16-20PL	
					956034480	NUT ESNA 3/4-16 PLT	
					93416810	LOCK WASHER 1/4 SPLT 3.6	
					936136930	LOCKWASHF - 3/8 SPLT S.S.	
					00027741-10	VALVE-DR.	
00716040	00777820					TUBE - ROTATION	-
						TUBE - ROTATION	-
						BEARINGS - GUIDE	-

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB ASSY.	1ST SUB	2ND SUB	3RD SUB	INDIVIDUAL P/N	DESCRIPTION	QTY
00715040	00770230					TURRET BUMPER AFFF 800GRM HMD	
						BRACKET ASSY - MTG.	
					007251-40	SHROUD SET - COLUMN	
					0006503-10	COLUMN - BASE	
					000154-12	SHAFT - COLUMN	
					002254-20	TUBE - COLUMN	
					000165-22	BLOCK - SWIVEL	
					000168-B-TC	BEARING	
					0000569-0	SPACER	
					007703-10	BEARINGS - SUPPORT ASSY	
					007705-20	ACTUATOR ASSY-HMD	
					007706-10	SHAFT - DRIVE	
					002255-20	ARM - COLUMN	
					007708-10	GEAR	
					007708-0	SPROCKET	
					94040210	BEARING	
					948020030	KEY 3/16 SQ 1/2-4 1/2 S.S.	
					98101250	RET RING 3/16-1/2	
					981002250	RET RING N5000-223	
					93100320	SCR HX HD 1/4-20 1/2 PT.	
					931343100	SCR HX HD 1/4-20 1/2 SS	
					93253200	SCR HX HD 5/16-18 1/2/B.S.S.	
					95432140	SCR HX HD 5/16-18 1/2/S.S.	
					95635310	LOCKWASHER 5/16 SPLIT S.S.	
					95635320	LOCKWASHER 5/16 SPLIT S.S.	
					95610320	WASHER-FLT 5/16 S.S.	
					00082810	DISC ROTAC	
					93602430	NUTESNA 1/4 16 S.S.	
00715040	00770230	0077520				ACTUATOR HYD ASSY	
					00777420	FUSE CYLINDER	
					00777630	PISTON BACK	
					005278-10	HUSA CUP	
					958300380	"O" RING 2-5/8 x 2-3/4 x 1/16	2

P-4 AIR TRANSPORTABILITY CONVERSION KIT
BILL OF MATERIAL
PART NO. 007980-10

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB. ASSY	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00718040	00811020	00778820			008788-10	VALVE CONTROL 8-WAY	-
					008887-10	VALVE 8-WAY ASSY	-
					008887-10	PLATE WOBBLE	-
					008811-10	IMPACTA	-
					84202000	SWITCING MECHANISM-S1	-
					001881-10	SPHERICAL BEARING	-
					008888-10	HANDLE CONTROL	-
					008888-20	SCR. NO HD 7/4-BSX 1/2	-
					80800010	PORT LOCATION (DATA SHEET)	-
					007882-10	PLASTIC CONTROL SWITCH	-
					8801000070	SWITCH (NORMALLY OPEN)	-
					84380000	8-32 1/2 LOG OVAL HD SCR. STST	2
					9139480000	10-24 1/2 3/8 SCR. CUPPT	-
					9221000000	HANDLE CONTROL 22MM 1/2	1.0
00718040	00811020	00778820	00878810		008788-20	VALVE CONTROL 8-WAY	-
					008784-10	BODY VALVE	-
					008784-10	SWING VALVE	2
					008788-10	CAP VALVE	-
					008787-10	SPACER VALVE	-
					008781-10	WRENCH VALVE	-
					888300140	SPRING 7/16 DIA 7/32 CO 1/16	2
					888300090	O-RING 3/4 DIA 1/8 CO 1/16	4
					888921100	O-RING 3/4 DIA 1/8 CO 1/16	4
					881000070	LEFT ARM 800-17	2
					882882070	RIGHT ARM 800-17	2
					914680020	SPRING LEG LC 063 H4MW	2
					934941140	1/4-20 17/32 LG. SOC. HD. CAP SCR.	4

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB ASSY	1ST SUB	2ND SUB	3RD SUB	INDIVIDUAL P/N	DESCRIPTION	QTY
00798040	00772140					TURRET BUMPER ASSEMBLY	1
					0077111-10	PLATE CENTRAL ASSY	1
					0077112-10	BRACKET-CONTROL	1
					0077113-10	PLATE-CONTROL NAME	1
					0077114-10	VALVE-DECENTRAL ASSY	1
					0077115-10	VALVE-DECENTRAL ASSY	1
					0077116-10	VALVE - 2" FACE	1
					0077117-10	DISPENSER CONTROL ASSY	1
					0077118-10	CONTROL-DRIVEN-QUAD-FOAM	1
					0077119-20	VALVE-DECENTRAL ASSY	1
					0077120	SCR. RD ND PHILL. /4-20-3/4 L8.	4
					0077121	SCR. RD ND PHILL. 6-31-1/4 L8.	2
					0077122	SCR. RD ND PHILL. 10-24-1/4 L8.	2
					0077123	SCR. RD ND PHILL. 10-24-1/4 L8.	2
					0077124-10	BLACK - SELECTION CONTROL	1
					0077125-10	WASHER - 1/4 S.S.	2
					0077126-10	NUT HEX. 1/4-20 UNG. 2B 3.6.	2
					0077127-10	SCR. RD ND PHILL 1/4-20-1/4 L8.	2
					0077128-10	SCR. RD ND PHILL 1/4-20-1/4 L8.	2
					0077129-10	NUT HEX 1/4-20 UNG. 2B	2
					0077130-10	NUT HEX 1/4-20 UNG. 2B	2
					0077131-10	LOCKWASHER 6-31 SPK.	2
					0077132-10	LOCKWASHER 10-24 SPK.	4
					0077133-10	PIN 8-3.	1
					0077134-10	"RING TRUANG 5123-25	2
					0077135-10	LINK, DEFLECTOR CABLE ALUM.	1
00798040	00772140	00771360				VALVE-DECENTRAL ASSY	1
					0077111-10	DECENTRAL VALVE ASSY	1
					0077112-10	SCR. RD HD 1/4-20 1/4 L8. PLT.	1
					0077113-10	KNOB	1
					078000080	ELBOW 1... 1" X 3/8" STUB	1

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO 0077880-10

ITEM P/N	SUB ASSY	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY.
0077880-40	00772340	00778820	00778820			DECONTROL VALVE ASS'Y	
					007224-20	BODY, VALVE DECONTROL	
					007232-20	SHAFT, VALVE DECONTROL	
					000084-10	SPRING, CLUTCH	
					961305080	BAL, 6/32 DIA .9 .8	
					932947040	SCREW, 3/8-16 X 1 1/4 L. PLT.	
					952116120	PISTON, 9/32 DIA 1 3/4 L. 33	
					952116070	PIR ROLL, 6/32 DIA 1 7/16 L. 33	
					988360420	"O" RING, 1/2 OD X 1/3 ID X 1/16	
					981100260	PIRENE, 1/16 O.D. X 1/16 I.D.	
						DISCHARGE CONT ASS'Y	
					007724-20	ARM CONTROL ASS'Y	
					007724-10	HANDLE-CONTROL	
					000088-0	KNOB-HANDLE	
					007727-10	BRACKET DISCHARGE & CONT	
					007727-10	SWITCH(HORN, OPEN)	
					952116200	PH ROLL, 3/8 A 1 1/4 L. Q.	
					921200080	STUD - NAIL	
					930431160	SCR NY ND MACH 1/4-20 X 1 1/2	
					924221140	NUT, HEX, 1/4-20 - N.C.	
					002298-10	BUSHING, BOR, BRONZ	
					981100210	WASHER, 1/4 IN	
					007728-10	PIN, 3/8.	
					981200370	"E" RING, TRIANG, 11/16-17	
					0077882-10	LINK-DEFLECTION CONTROL	
					0013630-10	LOCKWASHER, SPLIT RING 1/4-1	
					036131000	SCB, RD HD 1/4-20 UNCR/2 L8	
					007774180	CONTROL ARM ASS'Y	
					007774-10	ARM-DEFLECTION CONTROL	
					007741-10	BLOCK-CONTROL	
					007742-10	NUT - TAC	

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB. ASSY	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00718040	00772540	00772520			007724-10	DECONTROL VALVE ASSY	
					007729-20	DECONTROL - VALVE	
					000020-30	KNOB	
					9730000000	MALE FLON / FANTEX 8 TUBE	4
00718040	00772540	00772520	00773620		007724-10	DECONTROL VALVE	
					007729-10	BODY - DE CONTROL	
					981820270	SHAFT - DE CONTROL	
					981110330	"H"ING 6144-37 STEEL PLT	
					932938040	WIOFLAT WASHER	1
					98930000	SCREW, SETNO -321/4-10 PLT	1
					000061-10	"O" RING 1/4" X 1/8" X 2	2
					98102000	BALE 5/82 DIA 3.8	
					93219060	SCREW RD HD 10-32 X 3/8 LGA	
					93414380	SHOLOCK WASHER	
						TURNEY BUMPERFFF BOCHE HYD.	
						STROKE CYL 3" (ELEVATION)	
					000080-10	PISTON R. 300	
					000081-10	RED WIPER SEAL	
					000092-10	HOOD	
					000093-10	ROD BEARING	
					000094-10	END SEAL	2
					000095-10	CYLINDER BODY	
					000096-10	PISTON	
					000097-10	PISTON SEAL	
					000098-10	CAP	
					000099-10	PISTON AIR NARING NUT	
					001001-10	PISTON TO RED SEAL	
					001002-10	BUSHING	

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB. ASS'Y	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00798040	00798020				007976-20	TURRET BUMPER APP 800 GPM HYD.	1
					007976-50	HANDLE ASS'Y	1
					007976-50	HANDLE	1
					009411-10	HANDLE HOLDER	1
					009411-10	HAND GRIP	1
					660166070	PIN - DIVERT ASST (ARST)	1
					91345120	SCREW SD. HD. 10-24 JUNG 3/4	1
					91816680	LOCKWASHER 10 A.R.	1
					992128100	PIN - ROLL 1/4 31. 1/4	1
						TURRET BUMPER APP 800 GPM HYD.	1
						TUBING ASS'Y	1
					977100010	VALVE - MIDDLE 3/8" NPT X 3/8" NPT	1
					9771000020	CONNECTION - STR 1/8 NPT X 3/8 NPT	1
					973000070	ELBOW 1/4 NPT X 3/8	2
					973000020	ELBOW - UNION 3/8" NPT X 3/8"	1
					971162100	CONNECTOR 1/8 NPT X 1/8 NPT	2
					977900040	PIPE 1/8" NPT X 1/8" NPT	1
					974100080	PIPE 1/8" NPT X 1/8" NPT	1
					9780120000	TUBING - HYD. MARIA 2	2
					9780110000	TUBING - HYD. 1/4 X 9"	1
					978000080	ELBOW 1/8 NPT X 1/8 TUBE	1
					9714800000	CLOSE - NIPPLE 1/8	1
						TURRET BUMPER APP 800 GPM HYD.	1
						WIRING - DIAGRAM	1
					922100060	WIRE - 5' 9A	20
					921200010	TERMINAL SRDS 14 - RIB 26 D1	6
					921200060	RING - CONNECTOR FOR 9 ROUND	2
					921200110	TERMINAL CONNECTOR	1

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB ASSY.	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
0080480						KIT - ROOF TURN MODIFICATION P-4	
						PLUG-8IN 3/8 NPT	2
						COUPLING 3/8 NPT UR	2
						NIPPLE 3/8 IN 1/2 LD BR.	1
						NIPPLE 3/8 X 1/2 LD BN.	1
						ELBOW 90° 3/8 IN NPT	2
						CONNECTOR - MALE TUBE 3/8 IN 3/8	2
						TUBE 3/8 NYLAFLOW TYPE H	15.0
						ELBOW TUBE 3/8 X 3/8 BN.	8
						NIPPLE SOLID 3/4 NPT	1
						TIE - CABLE PLASTIC	5
						FILTER-OIL	1
						CONNECTOR MALE STRT. BR 1/4 X 1/4	2
						TUBE 3/8 NYLAFLOW TYPE H	3.0
						TIE - PVC CLIP, BLACK NYLON	1
						WIRING ASSY P-4 SPEAKER BEACON	
						LIGHTS	
						BRACKET LIGHT SPKA SE CAD	
						BRACKET LIGHT SPKA SE ALUM	
						SCREW HD PHILLIPS 32-8/16S.	3
						LOCK WASHER PLATE STL. 8.3	3
						NUT HD STDB 32 STL. 8.3	3
						SCREW HD CAP 1/4-20 X 1 1/4 LD.	2
						WASHER PLAIN PLAT 1/4 8.8.	6
						LOCKNUT 1/4-20 UNC 8.8.	6
						SCREW HD CAP 1/4-20-1 1/2 LD.	3
						LOCK WASHER 1/4 STL. 8.3.	3
						SPACER 1/8 SCHD 40 PINS 8/16S.	3
						WASHER STAY-0-8 FLAT STL. 8.8.	4
						SCREW HD 2 1/4-20-1/4 LD.	4
						BRONZE TUBE 1/4 IN DIA. 2 INC FT.	2
						CLAMP TUBING 1/4 DIA. 2 INC FT.	6
						TIE - CABLE-PLASTIC	6
						LIGHT- RED FLASHING MOD. L-68	1
0080080							

P-4 AIR TRANSPORTABILITY CONVERSION KIT
 BILL OF MATERIAL
 PART NO. 007980-10

ITEM P/N	SUB. ASS'Y	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	CRTX
00800130 (CONT.)						WIRING ASSY P-4 SPEAKER & BEACON LIGHTS	
					0088884-10	BONNET	-
					022100080	18 AWG TWIN LEAD	16
					022100060	18 AWG WIRE	48
					021201020	CONNECTOR BUTT 97502	6
					921200060	CONNECTOR SOLDERLESS TERMINAL	
						VENT ASSY WATER	
					027788-20	COTTER ASSY	
					007787-20	PLATE VENT	
					007788-10	ROD-SPRING RET.	2
					007749-10	GASKET-FLOAT	
					007788-20	GASKET-COVER	
					007783-20	GASKET-VENT	
					007763-10	BALL 2 1/2 DIA	
					933010240	SPRING-COMPRESSION S.S.	6
					918044500	WATER SNARL 8/1133	4
					936170200	WATER SNARL 8/1133	
					936173200	STAL-O-SEAL 8/8.3	6
					936173700	STAL-O-SEAL 8/8.3	
					933010010	WIRE 048 DIA. ST. STL	2
					00778880	VENT ASSY	
					007788-20	TUBE DRAIN	
					007784-20	VENT ASSY	
					007788-10	CAP-VENT	
					007788-10	HUG-VENT	
					007788-10	BALL-VENT	
					007780-10	GASKET-PLAQUE	
					007780-10	NOSE-DRAIN	
					920510400	CLAMP-HOSE 2-1/4-3"	
					920510400	CLAMP-HOSE 2-1/4-3"	
					981122570	FLANGE-ON 2-1/4-3"	
					981027000	FLANGE-BOD. 2000 S. 3	
					982112320	PIN ROLL 1/8 DIA. X 2 L. 3.3	
					0077804-10	SPRING-VENT	

P-4 AIR TRANSPORTABILITY CONVERSION KIT
BILL OF MATERIAL
PART NO. 007980-10

ITEM P/N	SUB. ASSY	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY.
00778880						VENT ASSY	-
00779140					007792-10	FLANGE-VENT	-
0078820					007791-10	VENT-TO-MAN	-
						PIPING ASSY	-
					007818-20	PIPE ASSY	2
					000485-10	CLAMP ATROSEAL	12P
					970612000	TUBING HYD NYLAFLOW 3/8 DIA.	
					970310000	ELBOW 1/2" STYLICHAULIC	
					970600090	ELBOW RED 3/4"X3/4"X1/4" DIA.	
					970320120	ELBOW 90° 3/4" VIC.	
					971210010	PIPE 4" X 1/2" NPT 1/4" VIC. 30" LG.	
					99731420	HANGER ASSEMBLY PIPE	
					971210010	PIPE 3" X 1/2" NPT 1/4" VIC 48" LG.	
					971205000	PLUG 2" M.L.	
					007824-10	SHIM "U" BOLT PIPING STL CAD	2
					008477-10	COUPLING REGLED 3/2" X 2" VIC NO 780	
					914102110	COUPLING PLVIC STYLE NO 780	2
					930138200	LOCKWASHER 1/2" SPLIT STL.	2
					838130200	WASHER 1/2" STL	2
					007986-0	NUT BOLY 5/8" - 12UNC 28SS	2
					009028-20	PIPING - SHUT-OFF VALVE ASSY	2
					930120230	"O" RING DURA - N 4-7/8 X 1-3/4" 376	2
						1-3	
					930141360	NUT HU 1/2" - 12UNC 28SS	2
					926500070	ELBOW 1/4" NPT MALE 3/8" STUBC	2
					990010014	CLIP/RP	2
					00616-10	BRACKET	2
					930110010	SPRING O-RING	2
					930120380	LOCK NUT 10-24 UNC-28	2
					974200000	CLOSE NIPPLE 1/2"	2
					971201010	ELBOW 80° 1/4" NPT 1/2" STUBC	2
					970000000		

P-4 AIR TRANSPORTABILITY CONVERSION KIT
BILL OF MATERIAL
PART NO. 007980-10

ITEM P/N	SUB. ASS'Y	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
007766820						PUMP ASS'Y	1
00802820						PIPING-SHUT-OFF VALVE ASS'Y	1
						PLANGE ASS'Y	1
					007866820	VALVE ASS'Y 1/2" HYD. T/AUR	1
					0071414-50	VALVE 1/2" ENPT 1/2" VICS" LO.	1
					971214810	NIPPLE 1/2" NPT 10" LC.	1
					87144400	NIPPLE 2 1/2" NPT 10" LC.	1
007766820					007966-20	FLANGE	4
007966-20					007967-10	ELBOW - FLANGE	4
007966-20						VALVE ASS'Y 1/2" HYD. TRUNNION	1
007966-20					007968-50	VALVE IN-LINE	1
007967-20					007967-20	PLATE-MOUNTING CYL.	1
					007849-10	STEM - ADAPTER 28	1
					007141-10	SPACER	1
					004318-30	ACTUATOR	1
					006036-10	GEAR (HYD. TRUNNION VALVE)	1
					910020200	KEY-WOODRUFF 3/8" S08	1
					007918-10	HANDLE (1 1/2" HYD. TRUNNION)	1
					009102-10	SHRIP VINYL	1
					007184-20	GUARD - BEAR	1
					007866-10	SPACER - SWITCH BRACKET	1
					007092-10	BRACKET - SWITCH	1
					9114400	SCR. SLOT FLT. NO CAP 7/16-14	1
						UNC 2 A-21/2A CAD PL	1
					971211120	SCREWD HD 1/4-20 UNC 2A-21/2A	1
					910136810	LOCK WASHER 1/4" SH 8.8.	1
					910042470	NUT JAM 9/16-11 UNC-28	1
					91030470	WASHER 9/16 ID	1
					902131200	PIN ROLL 3/8 DIA 1 1/4" L 8.8.	1
					94642040	SCR. PAN HD SELF TAP 1/4" 1/4" LO.	1
					911225110	PIN. ROLL 1/4 DIA 1/4" L 8.8.	1
					971000020	ELBOW BR. 90 1/2" APT 3/8" TUBE	2
					971420000	NIPPLE 1/2" CLOSE BRASS	2
					971212010	COUPLING 1/2" BRASS	1
					971000020	CONNECTOR STRG 1/2" NPT 1 3/8" LT	1

P-4 AIR TRANSPORTABILITY CONVERSION KIT
BILL OF MATERIAL
PART NO. 007980-10

ITEM P/N	SUB. ASSY.	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00780520	00602520	00780500	00631820			VALVE ASSY. 2-1/2 IN. TRUNNION ACTUATOR	-
						TOE - CYLINDER	-
						PISTON TUBE	-
						ROD CYLINDER	-
						CAP - END	-
						HAVA CUP	-
						" O RING - 012 BUNA-N	-
						" O RING - 051 BUNA-N	-
						" O RING - 208 BUNA-N	-
						NUT, HEX. 1/2-20	-
						LOCKWASHER, INT. 1/2	-
						SEAL - STAR - 1/2	-
						VALVE ASSY. 2-1/2 IN. TRUNNION	-
						HAMMER ASSY - PIPE	-
						MOUNT ASST. HANGER	-
						SADDLE, 4 STICK 2-1/2" TAP	-
						GASKET	-
						SCR. NX. NO. 870-11 x 17/8 PLT.	-
						NUT, IR. 870-11 PLT.	-
						LOCKWASHER, S/S SPLT PLT	-
						HANGER ASSY - PIPE	-
						MOUNT - HANGER	-
						PLATE - MOUNT	-
						HIPPLE - MOUNT	-
						COVER - BASE	-
						GASKET - 8/1 COVER	-
						PLATE, COVER - CONTROL BRACKET	-
						GASKET - CONTROL BRKT COVER PLT	-

P- 4 AIR TRANSPORTABILITY CONVERSION KIT
BILL OF MATERIAL
PART NO. 007980-10

ITEM P/N	SUB. ASSY	1ST SUB.	2ND SUB.	3RD SUB.	INDIVIDUAL P/N	DESCRIPTION	QTY
00303710						COVER- CABLE HOUSING	1
00808210						GASKET - CABLE HOUSING COVER	1
00803510						PLATE, COVER - ROOF LOCK	1
00804910						GASKET - ROOF LOCK COVER PLT	1
00803610						PLATE - FEEDLINE	1
00805110						GASKET - FEED, LINE PLATE	1
93543120						SCR. HX. HD. CAP 1/4- 20 x 1-1/4" L.G. SS	6

END

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